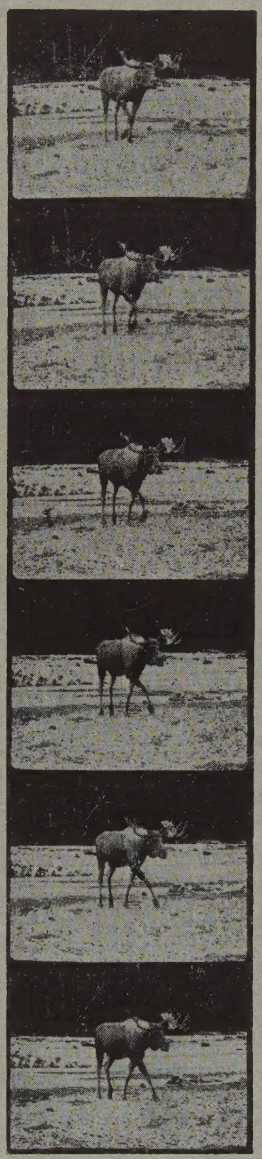
Nature Magazine

VOLUME 33 NUMBER 6

JUNE-JULY 1940
35 CENTS

Broaden Your Horizons



These remarkable motion picture films will take you far and wide in the world of the wild

For forty years William L. Finley has been shooting wildlife. But everything he has shot still lives for it was shot with a motion picture camera. More than two hundred thousand feet of film now carry the record of his camera hunting.

Two years ago the American Nature Association commissioned Dr. Finley to edit eighteen 400-foot reels of 16 millimeter motion picture film, drawing upon the best of his material. Thus 200,000 feet of 35 millimeter film are condensed into the equivalent of 18,000 feet of the best shots of all.

Thirteen reels are now available in three groups. A fourth group is in preparation.

GROUP I: Specially adapted for school use and for juvenile audiences.

11. ***Babes in the Woods:*** **The life of Nature's young in the wild.**
12. ***Wild Animal Pets:*** **A naturalist's dog into whose life came many strange animals.**
13. ***Renting Houses for Songs:*** **An intimate study of bird life.**

GROUP II: A spectacular series of Alaskan reels.

21. ***Cruising North:*** **Murres, sea puffins, bear and other coastal wildlife.**
22. ***Off to Glacier Bay:*** **Spectacular pictures of the face of a glacier breaking off and plunging into the bay. Also wildlife scenes.**
23. ***Wild Animal Outposts:*** **Hardy Island deer, ptarmigan, bear cubs, blue fox, fur seals of the Pribilofs.**
24. ***Thar She Blows:*** **Whales at sea.**
25. ***Great Bear of Alaska:*** **Films of the great Kodiak bears of Admiralty Island.**

GROUP III: Southwestern series.

31. ***Wings to the South:*** **Bird life of the Texas Gulf coast and the southwest.**
32. ***Riding the Rimrock:*** **Searching the rough country of the southwest for its wildlife.**
33. ***Nature's Side Show:*** **The struggle for existence in the arid southwest.**
34. ***Queer Creatures of the Cactus Country:*** **A study in the adaptation of wildlife to a harsh land.**
35. ***Getting Personal with Mountain Lions:*** **A thrilling picture of a pack trip into lion country.**

RENTAL REQUIREMENTS

The Association will pay expressage or postage when films are shipped to customers. The customer will pay return mailing charges and will be responsible for films until returned to 1214 Sixteenth Street, N.W., Washington, D. C. Rentals will be shipped C. O. D. unless paid for in advance.

Films are to be shipped back the day after showing. No extra charge for time consumed in transit. When reservations are made, customers are urged to select 1 or 2 alternate choices.

RENTAL RATES

Group I—3 reels	$3.00
Groups II and III—Each 5 reels	$5.00
Single Reels or any multiple of those available—each reel	$1.00

Use This Coupon or Write Separately

Film Department
American Nature Association
1214 Sixteenth St.
Washington, D. C.

I am interested in the following films_____

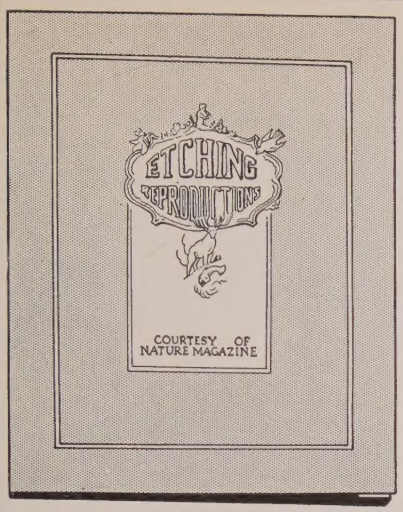
_____

and would appreciate having further information. I would need the films about_____

Name_____

Street and Number_____

City and State_____



Portfolios of Etching Reproductions

Eight Nature Etching Reproductions 9 x 12 inches in size, carefully selected from a large number of the best works of famous etchers of wild life, and inserted in an attractive portfolio.

★

These etching reproductions will delight nature-lovers and sportsmen. Ready for framing. Particularly suited for schools, libraries and recreation rooms.

★

Will Simmons . Polar Maternity
Diana Thorne . Making a Beseech
Richard E. Bishop . The Osprey
Charles Emile Heil . Chewinks
Winifred Austin . Pheasant Brood
L. R. Brightwell . Not Interested
Roland Clark . Gathering of the Clan
Carl Rungius . Lord of the Canyon

From the hands of famous etchers

50c a Set

while they last

Send your order today!

AMERICAN NATURE ASSOCIATION
1214 Sixteenth St., N.W., Washington, D. C.

TO THE EDITOR

Editor, Nature Magazine:

I wish to protest against the argument of the article entitled "Animals Do Not Spare the Rod", published in your February magazine.

The incidents related are interesting observations in the line of Nature study and it is true that "humans . . . are part of Nature", but, surely, it does not follow that humans should always imitate the practices of animals, even though these practices "have had the advantage of long trial".

It has been the endeavor of thinking and aspiring humanity to rise above the purely animal instincts. The struggle is hard but has never been given up. War "has had the advantage of long trial", and has proved successful in the eyes of some people and nations, but in the eyes of others it is an evil to be resisted, and, if possible, finally defeated.

Observers in field and wood have found many examples of courage and devotion among animals and these examples we may do well to emulate, but let us not therefore throw away reason and revert to the limitations of the animal world.

The mother animal finds it necessary to use corporal punishment in order to enforce obedience, since she is incapable of using any other method. This is not true of the human mother or father. Human parents have entrusted to their care, not only the bodies, but also the minds and spirits of their children. They should not think of the moment only, but should take a long look ahead. Careful thinking, true sympathy, honest endeavor, and this same long look ahead will bring better methods and better results to the children of the human race.

GRACE D. ELY

Editor, Nature Magazine:

Referring to that part of your article in the January issue—entitled "Wildlife Management and our Big Game Animals"—that relates to Utah, may I say that every person in southern Utah acquainted with the range knows that we have one of the worst overgrazed areas by deer in the United States. Even the head game officials know and have admitted that it is a serious condition, but the masses of the people are interested in hunting and not in the condition of the range. Last year I went on an inspection trip with a distinguished group of foresters and wildlife specialists, who afterward agreed that the Grasscreek division of the Fish Lake National Forest was one of the worst overgrazed areas in the whole country.

The condition is becoming so serious that all of the private landowners in the state who are affected by this over-grazing met in January to discuss ways of stopping the outrage. Some of the private land has been made almost valueless from over-grazing by deer, and the State Fish and Game Department has made purchases of such lands for as low as $1.00 per acre. GRANT D. STAPLES

NO INCREASE for WORLD'S FAIR!

Empire rates will begin—as always—at $2.00 single; $3.00 double. Send for **FREE** booklet D.

HOTEL EMPIRE

BROADWAY at 63rd ST.—NEW YORK

"At the Gateway to Times Square" E. B. BELL, Gen. Mgr.

Gateway to the Columbia Icefield

JASPER

PARK LODGE

IN THE CANADIAN ROCKIES

Newest of vacation experiences! The unforgettable 75-mile motor drive through Jasper National Park *right* to the spectacular Columbia Icefield. That's only *one* of the thrills awaiting you here in the heart of the Canadian Rockies. Golf—ride—hike—fish—swim—or just loaf luxuriously. You'll enjoy the social life at Jasper Park Lodge. Rates, with meals, as low as $8.00 a day.

Your vacation dollar goes farther in Canada this year. *No passports required.* As always, a friendly welcome awaits you at the Border and throughout the Dominion.

Low fares. Come by the air-conditioned *Continental Limited.* Call or write any Canadian National office for illustrated booklets of Jasper, Canada, and Alaska tours.

Boston . . . , 186 Tremont St.
Buffalo . . 22 N. Division St.
Chicago, 4 S. Michigan Blvd.
Cincinnati . . 206 Dixie Term.
Detroit . . . 1239 Wash. Blvd.
Duluth, 428 W. Superior St.
Kansas City, 101 West 11th St.
Los Angeles, 607 S. Grand Ave.
Minneapolis . 711 Marquette
New York . . . 673 Fifth Ave.
Philadelphia . 1500 Chestnut
Pittsburgh . . . 355 Fifth Ave.
Portland, Me. . . G.T.R. Sta.
San Francisco, 648 Market St.
Seattle . . . 1329 Fourth Ave.
St. Louis, 314 No. Broadway
St. Paul. . . 335 Robert St.
Wash., D.C., 922 15th, N.W.
Montreal, Que., 360 McGill St.

CANADIAN NATIONAL

TO EVERYWHERE IN CANADA

Camera Trails

BY NORRIS W. HARKNESS

CECROPIA MOTH—PRIZE-WINNING PICTURE TAKEN BY HOMER SIMS, NORTH LAKE, WISCONSIN WITH A R.B. AUTO GRAFLEX, 1/75 SECOND AT f.6.5. SUN BRILLIANT AT 3:00 P.M. AGFA SUPER PLENACHROME FILM PACK

Some Things to Remember

Summer comes and days that call us into the wide open spaces with our cameras, but we often travel far without finding anything that seems to be the sort of picture material that we want. On such a day we can sometimes make valuable exposures—negatives that will either teach us more about our films, camera, or filters, or shots of clouds and general scenes.

Worthwhile negatives may be made by shooting the same scene with every filter we have. The first might be made with no filter, and in accordance with the meter reading for the scene. The others should be given the longer exposures that the filter factors of each one require. The prints—not the negatives—will show the effect of each different color, and you will know a lot more about the things a filter can do for you.

Still another set of what might be termed wasted negatives would be those made at different stops with the shutter speeds adjusted to give each the same exposure. The first might, for example, be shot at $\frac{1}{10}$th at f/4.5, the next at $\frac{1}{25}$th at f/6.3 and so on to $\frac{1}{200}$th at f/16. The change in the depth of field as the diaphragm is stopped down will make an informative study. If the camera is focused on about the ten-foot mark, both edges of the sharp field will be visible in the prints, and if the lens is set on the infinity mark, the near edge of the sharpness will be seen to approach the camera. In either event the prints from these negatives will make us more familiar with what happens as we adjust the camera's gadgets.

Often the last few exposures on a roll may be used in some of the above ways, but remember that we will learn more if we make a note of the settings of each one and then check the resulting prints against the notations. Maybe some such series of shots will tell you why the last picture was not all that you hoped it would be.

Underwater Photography

Any one who has ever seen the glories of the landscapes, if we may call them such, that are visible through the glass bottoms of some of the boats that may be hired in our southern waters, will be interested in the idea of making pictures underwater. The bottoms of our lakes and streams are full of plant life and natural formations that make good pictures, and the Nature photographer will find innumerable uses for a device that will enable him to make pictures not only of objects in the water and on the bottom, but also of things on the surface as they appear from below.

This fish-eye-view, so to speak, may be obtained in several ways, and a number of gadgets for the purpose have been described from time to time in the photographic magazines. Perhaps the simplest to make and use, and at the same time one of the most efficient, consists simply of a deep box with a piece of good quality glass fastened securely in its side at one end. The box I have used was built of half-inch wood and was 30″ long, with a cross section 10″ square. The glass itself was a quarter-inch plate, 8″ square, and held in place in the bottom of one side of the box by ¼″ x 1″ strips of wood. The glass was backed with felt that had been impregnated with a waterproof cement before the heavy strip was wrapped around the edge of the glass and then held in place by the wood strips. The whole box was screwed together tightly and then painted with a good quality varnish on the outside and flat black paint inside.

The camera was fastened with a strip of a rubber inner tube so that the lens touched the glass and was fired with a cable release that extended nearly to the top of the box. The camera was placed at the bottom of the box and the center of the lens was some 3″ from the bottom. Just above the lens was a mirror, 6″ wide by 9″ long, which lay on guides fastened to the sides of the box perpendicular to the window so that the mirror was at an angle of 45 degrees to the plate glass. The edge of the mirror touched the glass. Fastened to the edges of the open end of the box was a black cloth, which served the same purpose as the focusing cloth that we use in focusing a ground glass back camera.

The method of operation was simple. Rowing slowly over the lake, the operator of the undersea camera places his face near the open end of the box and covered his head with the black cloth. Looking into the mirror he could see just about what was included in the field of the camera. The box, which would have been more convenient had it been fitted with handles, was turned until something of interest was discovered. The distance from the camera to the object was estimated quite accurately from the size of the reflection in the mirror, and the box was quickly raised so that the focusing mechanism of the camera could be properly adjusted. Then the box was replaced in the water, the composition made correct and the exposure made with the cable release.

The fastest panchromatic films are recommended, and while the exposures cannot be definitely stated, of course, since the daylight varies and the amount of light reaching our subject differs tremendously with the depth and the clearness of the water, the exposures that I have made in the summer have generally been at $\frac{1}{25}$ of a second at f/5.6. While my pictures were all of rock formations for the use of engineers who planned repairs to a bridge, one of my friends used the same device to picture fish and marine plants. One of his most interesting pictures was of the sun perch, as it is known in that part of the country, in the act of taking the hook. His companion held the baited hook some four feet in front of the window of the box, where he could watch what was happening in the mirror. As soon as the fish appeared and began to nibble at the bait, an exposure was made. The mirror was then tipped back against the edge of the box, the camera was

removed and made ready for the next exposure, and then all was returned to its original position. The climax of the series of five exposures came in the sudden flurry of movement when the fish first felt the hook. It is the only one of the series that shows any trace of motion even with this low shutter speed of 1/25 second. Subsequent pictures showed scenes made at a depth of two feet, and distances from 12 to 50 feet from the camera were excellent with the lens at f/4.5. But the difficulty involved here was in estimating accurately the distance from the camera to the subject.

The same gadget, or an adaptation of it, might well be used for the picturing of anything to be found below the surface of the water, and it will merely be necessary to experiment enough to determine what the

MALE LEAST BITTERN ON NEST—PRIZE PICTURE TAKEN BY JOHN J. STOPHLET, TOLEDO, OHIO

exposures should be. If it is desired, the meter may be held against the glass window so that it may record the available light for making pictures, and the readings thus obtained will usually be as accurate as those made above the water level. If, however, there is any trace of coloring matter or dirt in the water it may well have a filtering effect that will affect the meter reading and the required exposure as well, and under such circumstances we may find a variation in the required exposure as great as two or three stops from that indicated by the meter.

Among the shots I would like to see is one of a frog peeping over the edge of a leaf and looking down at the camera.

But perhaps this is not the place for me to turn my imagination loose. Any Nature photographer who takes the trouble to build and use an underwater "viewpoint" such as this will find so many picture subjects that he will not need my imagination. For this gadget opens to our lenses a complete new photographic world with as many pictorial opportunities as the one in which we live, and the subject matter available will have not only a new and rare beauty but a novelty that will add much to the photographer's reputation.

We should remember, moreover, that this underwater world has brilliant colors and is lighted sufficiently in many cases for us to use color film. Our exposures, of course, will have to be tremendously increased as the color films on the market today require some four stops more exposure than do the fastest panchromatic films. For color pictures underwater we must use the meter and add to the meter readings what we have learned from experience in using these films. Where very long exposures are required, and they, of course, are given usually only for stationary objects, a stake might be driven into the bottom, to serve as a brace for the camera box, while the exposure is being made. When this is done, there is nothing that will prevent our making the exposures as long as necessary. And this will permit us to record accurately anything we wish. There is, however, one other difficulty in the use of color films. The water, unless it is perfectly clear, acts as a filter and may affect the accuracy of our colors. Only careful test will tell us whether this is the case, but even if the actual colors are incorrectly recorded, we may still, despite this variation, have a more natural appearance and have a greater underwater effect in such pictures.

Our submarine may also be used for movie work, and I have recently seen some 16 millimeter movies made with a similar contrivance that were excellent in every way. The camera with which they were done had no cable release attachment, so the owner of the camera controlled it with a string fastened to the release lever and running from it through a screw eye to the top of the box. He focused the camera on 15 feet and was able to check the action by watching the mirror. By careful tests, he had worked out a mask of black cardboard that was fitted over the glass so that everything he could see in the mirror appeared in his pictures. Working in semi-tropical waters in the summer, his exposures with the fast panchromatic films and no filter were at f/4.5 at 16 frames per second. His color movies of swimming fish were not quite as satisfactory since his maximum lens speed was only f/3.5, and he, therefore, had to make his exposures at 8 frames per second. They, too, were interesting, but were somewhat underexposed in the darker parts of the picture area. One of his most effective shots—taken from as far below the water as his four-foot-long box would permit—was of a swimmer who, entirely without his own knowledge, was following close behind a fairly large fish. The reel that I saw was entirely of action shots, but it is his hope, during his next stay in southern waters, to make pictures of coral formations and other sub-marine attractions.

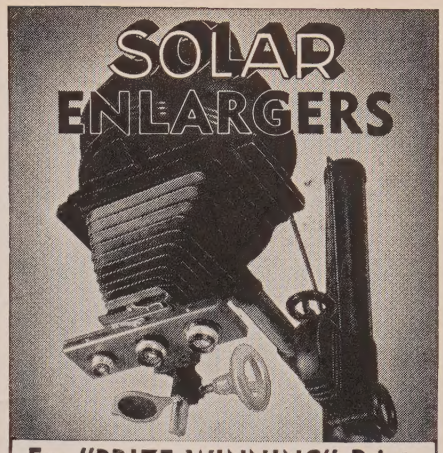
Whatever we may do with the gadgets of this kind, and no matter what our equipment or the kinds of pictures we may wish, we shall find that the making of pictures under water opens to us a new and fascinating photographic realm. I will be interested in hearing about your results and procedure.

The Contest

The task of Dr. Anthony and Mr. Lootens in picking the winners in our contest gets no easier fast. The fifty-odd prints you submitted this month are of a gratifyingly high quality, and there are few really poor prints among them. To date more than 250 prints have been sent to me from more than 100 entrants in 32 States and Canada.

The winning prints in the June-July Contest are "Cecropia Moth" by Mr. Homer Sims

(Continued on page 372)



For "PRIZE WINNING" Prints

For enlargements of Salon quality, you will want a Solar. Exclusive features, scientific design and substantial construction give you more in essential adjustments, efficient light system, ease in focusing, etc. Models for film sizes from 35mm. to 5x7 inches—with or without condensers. Be sure to see a Solar at your dealer's before you buy.

ENLARGING TREATISE N640 FREE

BURKE & JAMES, Inc.

223 W. MADISON ST. • CHICAGO, ILLINOIS

WE

Pamper Mortals

ON VACATION AT

POCONO MANOR

Excellent golf, riding, swimming . . . indoors and outdoors filled with entertainment for everybody—that's P.M. for your summer vacation. Delightfully cool, friendly and informal. Farm-fresh food. Bring the family to the top of the Poconos for the summer.

HERMAN V. YEAGER, General Manager

POCONO MANOR, PA.

Your Home

in

Atlantic City

THE RUNNYMEDE on beautiful Park Place, overlooking the ocean, is a favorite hotel for those who are accustomed to the finer things in life. Here you will find all those little refinements so essential and necessary in one's daily life—truly, "your home away from home."

Attractive Rates

The **Runnymede**

Everett J. Higbee, Manager

NATURE MAGAZINE

PUBLISHED BY THE AMERICAN NATURE ASSOCIATION

To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

IN THIS ISSUE

Camera Trails ..... Norris W. Harkness 314
Nature in Print ..... Howard Zahniser 319
Headlines on Eagles ..... Lewis and Marian Walker 321
It Can't Be Done ..... Doris M. Cochran 324
Isle Royale ..... Dennis Glen Cooper 325
Nyctia (Poem) ..... Hewson Swift 328
A Dwarf Rhododendron ..... Victor H. Ries 328
Grunion Run Tonight ..... Ray G. Funkhouser 329
"One Red Rose" ..... Maud MacDonald Hutcheson 332
Strange but True 334
Safe and Sane Watering ..... Adolph Kruhm 335
Sequoia Sempervirens (Poem) ..... Sister M. Pascal 336
Dwarfs that Live in Their Hats ..... George Elwood Jenks 337
Atlantic and Gulf Coast Shells ..... E. Laurence Palmer 341–348
A Samson of the Vegetable Kingdom ..... Leon Perl 349
Transplanting Beavers ..... M. M. Atwater 351
As We See It 353
Battling the Bugs ..... Adolph Kruhm 355
Sound-Placing by Birds ..... W. L. McAtee 357
Life with Ruby ..... Helen Saunders Woodelton 358
The Hermit Thrush (Poem) ..... Dorothy J. Griswold 360
"Stars" and Oysters ..... Lewis Radcliffe 361
Life of a Walking Stick (Poem) ..... Rosamond Tryon 362
The Evening Sky in June and July ..... Isabel M. Lewis 363
The School Page ..... E. Laurence Palmer 366
Under the Microscope ..... Julian D. Corrington 374

NATURE MAGAZINE, PAST AND PRESENT, IS INDEXED IN THE READER'S GUIDE IN YOUR PUBLIC LIBRARY

U. S. AND CANADA
ONE YEAR $3
FOREIGN .. $.75 EXTRA
TWO YEARS $5
LIFE $100

A. B. McClanahan, Advertising Manager

ADVERTISING OFFICES

New York—295 Madison Avenue
Washington—1214 16th St.
Chicago—203 N. Wabash Avenue
Philadelphia—323-325 Weightman Bldg.
Atlanta—Walton Building
Los Angeles—Western Pacific Building
San Francisco—Mills Building
Minneapolis—233 Radisson Hotel

NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A. Additional entry at Greenwich, Conn. $3.00 a year; foreign $3.75.

Publication and Editorial Office, 1214 16th Street, N. W., Washington, D. C. Additional Office of Publication, Greenwich, Conn.

Copyright, 1940, by American Nature Association

Title Registered U. S. Patent Office

THE ASSOCIATION

ARTHUR NEWTON PACK ..... President
Abiquiu, N. M.

RANDOLPH G. PACK ..... Vice-President
Darien, Conn.

RICHARD W. WESTWOOD ..... Secretary
Washington, D. C.

JAMES A. O'HEARN ..... Treasurer
South Orange, N. J.

HARRY E. RADCLIFFE ..... Business Manager
Washington, D. C.

DR. E. LAURENCE PALMER ..... Director, Nature Education
Cornell University, New York

THE MAGAZINE

ARTHUR NEWTON PACK ..... Editor

RICHARD W. WESTWOOD ..... Managing Editor

EDWARD A. PREBLE ..... Associate Editor

R. BRUCE HORSFALL ..... Artist

HARRY E. RADCLIFFE ..... Business Manager

SCIENTIFIC CONSULTING BOARD

DR. LELAND O. HOWARD
Retired Chief, U. S. Bureau of Entomology

DR. WALDO L. SCHMITT
Curator of Marine Invertebrates, U. S. National Museum

DR. HARRY C. OBERHOLSER
Senior Biologist, U. S. Biological Survey

W. L. McATEE
Technical Adviser, U. S. Biological Survey

C. W. GILMORE
Curator of Vertebrate Paleontology, U. S. National Museum

VERNON BAILEY
Retired Chief Naturalist, U. S. Biological Survey

DR. PAUL BARTSCH
Curator of Mollusks, U. S. National Museum

DR. EDGAR T. WHERRY
Wild Flower Preservation Society

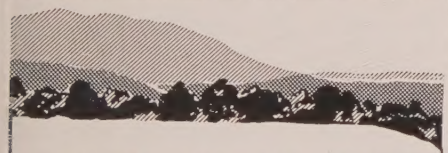
DR. WILLIAM M. MANN
Director, National Zoological Park

COME TO THE CHAMBERLIN

You'll enjoy 3 vacations in one here. There are sports activities, many places of historic interest, and the atmosphere of the Army and Navy at history's birthplace! You'll see beautiful gardens, and old St. John's Church. The Chamberlin's building and grounds are delightful—the sea view magnificent. Delicious food. Swimming indoors and out. Only a few hours away. Write for *special* weekly and week-end vacation rates.

See Nearby
WILLIAMSBURG
Yorktown • Jamestown
Fort Monroe • Mariner's Museum

The
CHAMBERLIN
Sidney Banks, President
OLD POINT COMFORT
VIRGINIA



FOR FUN AND FINE LIVING

CRESTMONT INN

EAGLES MERE, PA.
2200-ft. altitude

Marvelous tonic air adding zest to living, whetting appetites for superb Crestmont meals . . . long, leisurely hours on beach, lawn, verandas . . . every facility for recreation or relaxation . . . that's your *Crestmont Vacation!*

Sporty 18-hole golf course
Tennis, lake sports, lawn bowling
Riding, hiking, scenic drives
Music, bridge, dancing

Children's playground with a trained kindergartner in charge. No mosquitoes!

Write for illustrated folder D.

WILLIAM WOODS, Prop., Eagles Mere, Pa.

Francis of Assisi

Our first conservationist, our first lover of animals willing to fight for them, was Saint Francis of Assisi, who prayed: "Lord, make me an instrument of Thy peace; where there is hatred, let me sow love; where there is injury, pardon; where there is doubt, faith; where there is darkness, light; where there is despair, hope; and where there is sadness, joy. O Divine Master, grant that I may not so much seek to be consoled, as to console; to be understood, as to understand; to be loved, as to love; for it is in giving that we receive, it is in pardoning that we are pardoned, and it is in dying that we are born to eternal life." Would that Francis of Assisi might walk among men today and be heard. The life of this great Catholic Saint is told in a series of word silhouettes by Sister Fides Shepperson of Mt. Mercy College, Pittsburgh, Pennsylvania, in a booklet published by the American Humane Association, 135 Washington Avenue, Albany, New York. Copies may be obtained for fifty cents from that Association.

Tropical Seeds

Two or three years ago we announced the offer of the Pan American Society of Tropical Research to send seeds of certain exotics to those wishing them. At that time the Society had its headquarters in New Orleans. Its present address is P. O. Box 315, Quito, Republic of Ecuador, S. A. We have received word from J. Mortimer Sheppard, director, that a dime sent to the Society in Ecuador will bring a packet of seeds of two flowering plants of the Andes that are hardy and regarded as adaptable to North America. Planting instructions will accompany them. The plants are "Fresno del Pais" and "Guanto Rojo", which we'll admit doesn't enlighten us much. Postage to Ecuador is three cents. We're going to risk thirteen cents to see whether an Andean plant can stand Washington, D. C., in summer.

Nature Trail Marker

Brought out as a garden marker, but equally valuable for marking a Nature trail, is a recent product of the American Expansion Bolt and Manufacturing Company. It consists of a weatherproof metal stake with a patent notch into which fits a weatherproof plant label with a special finish upon which legends may be written in soft lead pencil and by some mysterious process become permanent. A seven-year experiment proved that these labels can "take it". Sun, wind, dirt, rain, frost, snow and freezing weather did their worst and the legends never lost a letter. There are several types and sizes, providing individual labels and display labels, the latter being best for Nature trail purposes.

Nature Recreation

Nature in the recreation program is given the entire editorial attention in the April, 1940, issue of *Recreation,* official publication of the National Recreation Association. Nature recreation in the national parks, national forests, state parks, municipal parks, summer camps and outdoor schools are described by those close to the work in these fields. The issue of the magazine is of outstanding value to anyone concerned with this subject.

Do insects raise welts while you raise flowers?

1. Who's Boss in Your Garden—*you* or the insects who look forward with glee to your arrival? *You* can look forward with glee to gardening now—for there's a new insect repellent lotion that *really protects!*

2. The Name of This Amazing Lotion—perfected after years of experiment by leading entomologists—is "STA-WAY." It's pleasant smelling, non-greasy. It's non-injurious to the skin. And it certainly lives up to its name!

3. People Lucky Enough to Use "Sta-way" last summer, when it was first introduced, found it *really* effective aid against insect pests. Try it! At drug, hardware and sporting goods stores for only 35¢ a bottle.

INDOOR comfort OUTDOORS

STA-WAY
TRADE-MARK
INSECT REPELLENT LOTION

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide UCC *and Carbon Corporation*
The word "STA-WAY" is a registered trade-mark of National Carbon Co., Inc.

What's Your Telephone Score?

EVERY DAY many pleasant voices go over the telephone. And it seems to us the number is growing. For most people realize the business and social value of "The Voice with a Smile."

Sometimes what may appear like a gruff or hasty manner is not meant that way at all, but is simply carelessness or thoughtlessness.

Since this is the age of quizzes, how about a short one on some points of telephone usage?

Do You Talk Directly Into the Telephone?

The proper way to use the telephone for best results is to hold the transmitter directly in front of the lips while you are talking.

Do You Speak Pleasantly?

Remember . . . it may be your best friend or best customer. Greet him as pleasantly as if you were face to face. Pleasant people get the most fun out of life anyway.

Do You Hang Up Gently?

Slamming the receiver may seem discourteous to the person to whom you have been talking. You don't mean it, of course, but it may leave the wrong impression.

Do You Talk Naturally?

Your normal tone of voice is best. Whispered words are indistinct. Shouting distorts the voice and may make it gruff and unpleasant.

Do You Answer Promptly?

Most people do. Delay in answering may mean that you miss an important call. The person calling may decide that no one is there and hang up.

"The Voice with a Smile"

can be a real asset. Haven't you often said of some one who has just telephoned — "My, but she has a pleasant voice." Or — "I like to do business with them because they are so nice over the telephone."

It's contagious too. When some one speaks pleasantly to you, it's easy to answer in the same manner.

Many times you form your impression of people—and they judge you — by the sound of a voice over the telephone.

BELL TELEPHONE SYSTEM

THE BELL SYSTEM CORDIALLY INVITES YOU TO VISIT ITS EXHIBITS AT THE NEW YORK WORLD'S FAIR AND THE GOLDEN GATE INTERNATIONAL EXPOSITION, SAN FRANCISCO

Nature in Print

By HOWARD ZAHNISER

I ONCE went canoeing in June and did not return until July. I shall probably not do that again this year, but I should like to. I do remember that Emily Dickinson declared "there is no frigate like a book," and books may also serve as river craft.

"In June, in the month which the priest called the month of the rutting buffalo, the-big-animal-that-stands-firmly-upon-earth," Wade Dorrance, a young professor of French at the University of Missouri, "tense like a tilted hawk," set off in an eighteen-foot boat "on the track of rain, of springs, of secret water from the clean places of the earth." His "canoe," called the *Ni-sho-dse,* or Muddy Water, the Osage Indian name for the Missouri River, was square-sterned to carry a small motor and had air chambers for steadiness in rough water. With this craft for transportation and an umbrella tent for shelter, Dorrance started down the Osage River and followed flowing water down-stream and up until some weeks later a cave-in on the banks of the Wabash ended his voyage—in due season, as he felt, although not in Vincennes, as he had planned.

"I am not sorry," he said after the near-disastrous end of the trip. "I have done what I came to do. I can go home now and sleep like bees when the comb is full. I have spent months with squirrels and chipmunks that sat humped as they opened an acorn, their eye impassive over the busyness of their paws. I have shared paths with rabbits that crouched where light shone through the thin tips of their ears. I have lain on a rock to sun, so still that a dove came down near by. It lay on one side, thrusting out one starfish foot, closing the other in a chapped red fist, lifting a wing to let the cool wind under. I have hidden to watch a young fox stalking pigeons, creeping forward on his belly. When they flew he broke and ran, looking up, not seeing where he stepped, rapid in the shadow of the flying birds. The squirrel, the dove and the fox establish an old harmony in me."

All this and more, this modern voyageur tells in a book entitled *Where the Rivers Meet* (Scribner's, $2.75), one of the most interesting and worthwhile outdoor books published in recent years. Down the Osage, down the Missouri, up the Mississippi, up the Illinois, down the Illinois and Mississippi, up the Ohio, up and down the Tennessee and up and down the Cumberland, up the Ohio, and up the Wabash—Dorrance voyaged about in what he feels is a central area of American history. He was conscious of the past as he traveled, and his readers are too, but more vivid are the men along the streams, and the streams themselves. "A stream does something," Dorrance says. "It moves."

Dorrance began his trip with, of course, a high regard for rivers, but he returned with a faith also in the permanence of their beauty, even in the midst of civilization. "This," he declares, "was the most heartening of my discoveries: that mill towns fester in one spot while the earth is green around them. The prairies will not be tamed. The hills will not be quite blasted away. The rivers will remain."

Where the Rivers Meet is the sort of volume that anyone who has read Thoreau's *A Week on the Concord and Merrimack Rivers* will always be looking for in a river book. The comparison is meant to be commendatory of Dorrance's work, which, in fact, is much more easily read. Dorrance's stream of narrative and discourse flows more rapidly than did Thoreau's, without digressions or lengthy dissertations. Scholar and philosopher as he proves to be, Dorrance keeps his mind where his body is. He finds it heartening to "fall in with facts of the cosmos." When he asks permission to pitch a tent he gets more than the satisfaction of his request when the landowner replies: "Boy, this here ten thousand acres is all mine. Reckon that'll do ye a spell?" Away from civilization he feels closer to what he would call real life. "Time is gone," he says. "Or Time is altered. There is no convict lockstep of days which are single and parts of a chain. The days are a flowing whole; the month is a mist about us, dense at the heart, feathering toward its edge. The years surround us and move with us. They do not cut us off." Mr. Dorrance persuades one into quotation. He has something worth saying to us, and he says it in a narrative that always holds interest.

Because of an accident of circumstance Dorrance did not see as much of the Wabash as he had planned and wrote very little about it. William E. Wilson, however, has written, in *The Wabash*, one of the better volumes in the highly valued series on The Rivers of America being published by Farrar and Rinehart ($2.50). The Wabash River is more than a stream to Mr. Wilson, as he says it is to every Hoosier. "The Wabash is Indiana." Like the other writers in this series, Mr. Wilson sets out to tell primarily a folk history. This he does with great interest and charm, and with a claim to historical importance that he well justifies with accounts of events in pioneer days and during the Revolutionary and Civil Wars. He describes with genial and benevolent pride "the rare fusion of southern grace and Yankee industry, which for more than a century has made the Hoosier one of the finest American types."

"The Wabash," Mr. Wilson explains, "is the smell of clover in June, of hay and sweetgrass. It is a dome of blue and golden sky, piled high with white clouds, and sun-soaked days filled with the hum of insects. It is the harvest moon and stars, like a chandelier of jewels in purple nights. It is the folks on their front porches waiting to go down and look at the river. It is the soft drawl of friendly voices, the creak of rockers, the scuffle of small boys, and the laughter of pretty Hoosier girls."

It would be hard to conceive of a more interesting way to tell the story of the Hoosiers and their history than that followed by Mr. Wilson. The (Continued on page 370)

CAESAR, THE GOLDEN EAGLE, WAS A WEIGHT-LIFTER

Trained to come to hand like a falcon, he was laden with different weights to test the truth of the many fantastic newspaper stories, a common type of narrative that tells of the feats of strength of powerful, vicious birds, with great spread of wings, that carry well-grown babes and fawns and lambs and other innocent victims into the upper air

NATURE MAGAZINE
VOLUME 33 · JUNE-JULY · 1940 · NUMBER 6

Headlines on Eagles

Many stories of their feats of strength are vivid but false

By LEWIS and MARIAN WALKER

Photographs by the Authors

SINCE the dawn of history eagles have been described as culprits that carry off babies, sheep, deer and goats and a variety of other victims. Even today, when we are supposed to be so scientific and so reasoning, such stories crop up periodically in our newspapers. The following news dispatch from Seattle, Washington, is a typical "masterpiece" of reportorial romancing. It has action, suspense, and in fact everything a story should have to make good "copy"—except, of course, the truth.

"A shadow circled high overhead, the child lay on its back and watched it interestedly," reads the news story. "The shadow narrowed its circle flying in a narrowed spot in the sun. Suddenly it swooped down with a terrifying whirr of strong wings, glistening black in the sunlight. The child screamed. Cries terrible and pained filled the air."

From the town of Gunpowder, Maryland, comes another. This one was headed by a picture that was captioned—"Bird weighed fifty pounds. Had a six-foot wing spread." It would be interesting to have a reliable airplane designer specify the horsepower needed to lift such a weight. But the story goes on:

"Attacked by two immense eagles as she played in the yard of her home here, three-year-old Betty Earnestburger was saved from possible death, or even from being *carried away,* when a friend of her parents fired on the huge birds."

And then from a late issue of the *Literary Digest*:

"The Meece boys and the Phelps boys were startled by a scream. Eight-year-old Jim Meece had run a short distance away from his brothers. A great, bald eagle had swooped down from the sky and fastened its talons in little Jim's leg. For perhaps two seconds there was a struggle, Jim fought wildly and cried out. The bird succeeded in lifting him from the ground, his head hanging down. The struggle continued as the eagle flew to a height, according to the estimate of the other children, of about seventy-five feet. Jim kicked out violently. The eagle flew lower. The boys on the ground screamed too. And at last the bird released its grip and Jim fell. It had flown a dis-

CAESAR POSES FOR THE CAMERA

Here he looks strong and capable, but he proved incapable of the strength credited to his brothers and his bald eagle cousins. He failed to live up to the press notices given his kind by reporters with vivid imaginations

FLYING FREE AND WITH NO WEIGHTS TO BOTHER HIM

Thus Caesar was able to soar for hours enjoying aerial maneuvers, and finally returning when he was called to the glove of his friend

tance of two hundred feet. There were bruises on Jim's legs from the grasp of the talons and bruises and cuts on his body from the fall at a height of about twelve feet, but otherwise he was sound and whole. Jim weighs only thirty-five pounds. If he had been a little lighter, the eagle might have succeeded in carrying him away."

For some reason or other we enjoy tying up the two sentences regarding Jim's age (8 years) and his weight (35 pounds)!

Every now and then magazines appear with similar stories. In almost every instance, however, the child has been saved. Often the rescue is achieved by the use of a trusty shotgun whose scattered pellets always hit the bird but never the baby! The wing spreads of these Samsonian eagles vary from three to fifteen feet. Their lifting, or carrying abilities usually are at least fifty pounds—or even more. The birds are never gentle; always ferocious. They are never cowardly; always courageous!

Last year we had the opportunity of making a life history study of golden eagles at an eyrie in southern California. A blind was constructed about thirty feet from the nest, and in this we spent many a weary hour. Sometimes full days were wasted waiting for one or the other of the "courageous" parents to return and feed their young. In spite of their heralded fearlessness, even when they did return the click of a camera or the slightest move on our part would send them off in a panic.

On one of our first visits to the nest food was found weighing approximately thirty-five pounds—Jim Meece's weight. It was made up entirely of injurious rodents—twelve rabbits and eleven ground squirrels. Hunt as we might not a single human bone was found! In days of watching and waiting we saw prey carried to the nest on many occasions. The record weight was a jack rabbit, which might have weighed four and one-half pounds. We may have underestimated a little because the eagle had quite a struggle carrying this rabbit.

The nest itself, measured by tape, was just six and one-half feet across. The adult birds sometimes spread their wings, and the tips just about reached from edge to edge. Try as we might we could not see the fifteen-foot span that the world has so often seen reported in print.

Three days after the young one left the nest he was tame and gentle, permitting us to walk within twenty feet of him before taking flight. Visions of a sad ending at the opening of the hunting season prompted us to take him captive and to train him after the manner used by ancient falconers.

Months passed. He became proficient in the art of flying, gliding and returning to his trainers. Then came the weight tests. We wanted an answer to the question: "How much can an eagle carry?" The site selected for the experiment was chosen to give "Caesar," as he was called, the best opportunity to prove his strength. The wind was blowing steadily at about ten miles per hour. An airport building with a platform about fifteen feet from the ground was chosen for the take-off spot. Weights of varying sizes were placed in socks and were fastened loosely about his feet. He was so accustomed to handling by humans that this part of the experiment did not excite or bother Caesar at all.

In all, six weighted flights were made, allowing a twenty-minute rest interval between each take-off. Carrying a one-pound weight on each foot the bird averaged 162 yards in normal, effortless, playful flight. On two subsequent flights, with the weights doubled, he flew sixty-four and fifty-eight yards, respectively. But while carrying these four pounds, Caesar was noticeably strained. The dips, glides and soaring circles were entirely missing from

TWO OF THE TEST FLIGHTS THAT CAESAR MADE WITH WEIGHTS

At the left he is being tossed into the air carrying two pounds. He made flights of 160 and 164 feet with ease. At the right he was given eight pounds to carry and, in two attempts, was able to struggle only ten and fourteen yards before landing

his aerial maneuvers. The next and the last tests were made with a four-pound weight on each foot. When so loaded he beat the air wildly, seeming to use every ounce of muscle to keep from crashing. His best distances with eight pounds were ten and fourteen yards. Twenty minutes later he was flown twice unweighted and he soared four hundred and sixty, and six hundred and twenty yards, before we called him down to the glove.

We realize that Caesar was a captive bird. As such he did not have the opportunity to exercise as would a bird in the free state. Undoubtedly Caesar was not quite as muscular as his wild brothers. To offset this, however, do all these wild birds, supposedly carrying off children and surprisingly heavy weights, have the advantage of a fifteen-foot platform from which to drop and gain flying speed? Are they catapulted into the air as was Caesar, or do they have the drag of dead weight to hinder them from leaving the ground?

In the light of these facts, let us hear two more yarns—yarns that appeared and were read and believed by many people. From Hugo, Minnesota, in 1935, comes an eagle story that about tops them all. It tells of an eagle carrying a child into the air (accompanied by the usual screams and struggles) only to be stopped by a power line that caused its electrocution. It dropped the child—unhurt!

The Audubon Society representative in Dassel, Minnesota, wrote of this in *Bird Lore* as follows:

"Here are the facts in the Hugo 'Eagle and Child' case. A golden eagle, with a wing spread of eighty-six inches, was apparently pursuing a hawk, and in its flight was caught between two automobiles on the pavement of a city street. It flew upwards and was electrocuted by a high tension wire just above. The bird was only slightly burned on one wing and is being mounted by Mr. Arnold Lindberg. The baby in the case, and its mother, were at the time of the eagle incident, 260 miles away, visiting, and the story, as given to the papers, was told as a joke. Mr. Lindberg later left a note stating the facts, and, in company with his brother-in-law, Mr. Charles Harvey, who was with him at the time of the eagle episode, is willing to supply details to interested parties."

We wonder how many eagles died for the sake of this joke?

And from Lynchburg, Tennessee, comes the following Associated Press report:

"Fifteen-year-old Floyd Tipps was a worthy foe for a massive golden eagle with a wing spread of thirty-five inches. [Note the wing spread. Eagles must be getting smaller but stronger!] The big bird came out a poor second yesterday to Floyd, who beat it to death with a stick as it tried to carry off his eight-year-old brother, Charles. Attracted by screams and shouts, Floyd said he ran to his brother's aid and found the eagle dragging Charles along the ground. Floyd grabbed a stick and flayed the bird across the head until it released its hold on the little boy. Then he killed it."

In reality, the bird was found by the two Tipps boys on the ground, apparently wounded or injured. They tried to catch it and the bird clutched the younger boy in its talons. The older one then hit it on the head and killed it. This story would probably end in the city editor's waste basket. Doctored with a bit of imagination, however, and enhanced with piercing screams and cries, it made a news item of much more exciting reading and provided more choice conversations. And think of the people they fool, including, perhaps, some members of Congress who will therefore refuse to pass a bill giving protection to the bald eagle—our National Bird!

FROG FOUND IN WALL REPOSES IN GLASS JAR

Morganton, Jan. 15.—The bullfrog found in a 60-year-old brick wall at State Hospital is dead.

The frog died two days after he was found between two bricks in the institution's Center Building, the State's largest single structure, which is now being remodeled.

A mortar joint inside a 24-inch wall was the frog's prison, and workmen said it was the only joint that was not tight, sealed with mortar, leading them to declare that they see no way for the frog to have gotten there unless it was there when the wall was erected.

IT CAN'T BE DONE

By DORIS M. COCHRAN

U. S. National Museum

TOAD SET IN CONCRETE 20 YEARS AGO ROLLS OUT, ALIVE AND WELL

Crowell, Tex., Jan. 15 (AP).—Henry Askford of the Foard County News is the authority for this story: Workmen removing a concrete block from the garden of Mr. and Mrs. Jeff Todd had to break the heavy mass. Out rolled a white toad, apparently dead.

As the sun warmed it up the toad opened its eyes and began to kick. Now it's alive and well.

ACCOUNTS of frogs or toads found by workmen entombed apparently in solid rock, in stone walls or mine tunnels, and which emerge alive, although frequently very thin, always rate as news in the daily papers. The question naturally arises as to how long these creatures have been confined in their natural prisons, and the answers, given entirely by guesswork, may vary from a few months to several centuries.

As long ago as 1825 an experiment was performed in England by the Rev. W. Buckland, Professor of Geology and Mineralogy in the University of Oxford, to "explain the frequent discoveries of toads enclosed within blocks of stone and wood, in cavities that are said to have no communication with the external air." A dozen boxes of sandstone fitted with airtight glass covers, and an equal number of limestone receptacles, were made. Each was provided with a live toad, and the boxes containing the sealed-up toads were buried in Dr. Buckland's garden under three feet of earth. Thirteen months later they were exhumed. Every toad in the compact sandstone boxes was dead, and had been so for some months. In the porous limestone boxes a few of the largest toads were still alive, but very much emaciated, excepting one, which had been able to catch small insects that had entered through cracks in the glass cover. These surviving toads were again buried, but before the expiration of the second year, all of them had died. At the same time that these experiments were being carried on, other toads were placed in cells cut in the side of a tree. These holes were plugged tightly so as to exclude most of the air. The toads shut up there were dead before the end of the first year. Dr. Buckland concluded from these experiments that "there is a want of sufficiently minute and accurate observation in those so frequently recorded cases, where toads are said to be found alive within blocks of stone and wood, in cavities that had no communication whatever with the external air."

One of the most serious problems of modern experimental biologists who are working with living amphibians is to keep toads and frogs alive and healthy in captivity, even under the best of laboratory conditions. Captive toads should be supplied during the summer with proper amounts of acceptable food—three or four earthworms or a dozen mealworms once or twice a week—and as they recognize only moving objects as food, the prey must wriggle before it is devoured. While toads can go without food for several weeks, or for more than a year if in a semi-torpid condition for a part of that time, a constant source of moisture is absolutely necessary to keep them alive. They will die in a few hours in dry air. Since they do not thrive indefinitely in confinement, even with care and attention to their wants and needs, scientists who have studied their habits and life histories know how impossible it would be for any of them to support life for a long time under such entirely unnatural conditions as would prevail were they to be encased in some impermeable substance from which water, food or air was excluded.

The persistence of the myth that frogs and toads can continue to exist when solidly embedded in rock is furthered by the fact that these creatures, especially toads, can and do persistently hide in small holes and crevices. The bottom of a deep excavation has no doubt often seemed an ideal place to escape the cold of night to some toad roaming about at dusk or seeking for a suitable place to hibernate. The summer's heat and dryness has probably often driven toads and frogs to burrow into chinks under old walls, or to wander down the entrance of mines into the darkness and cool moist surroundings, conditions imperatively necessary to an amphibian's existence.

The practise of entombing horned "toads", which are in reality horned lizards, has come from the belief that horned "toads" are toads, and, as such, endowed with the supposed ability to live for centuries in a cornerstone, or other enclosed subterranean cavity. Horned "toads" are even less hardy when taken out of their natural environment than are true toads, as any zoo director will sadly vouch. The length of life for the oldest horned "toad" in captivity was a year and eight months; for a true toad, the length of life in an individual living in a walled garden, in which conditions were ideal in their approach to those found in Nature, was sixteen years.

The only permanent cure for the perpetuation of this myth is a better understanding of the conditions under which our native amphibians live. Truth is more wonderful than fiction, and the study of the habits of frogs and toads will present facts more enthralling than any mere invented tale. Their adventures day by day in the home terrarium will be a continual thrill to everyone who cares to learn the secrets of these citizens of garden and stream.

A VIEW OF THE NORTH SHORE OF ISLE ROYALE

This scene of wooded islands is spread before the visitor to the new National Park who will climb to the rugged heights of Mount Lookout Louise

ISLE ROYALE

The story of the newcomer to the National Park family

By DENNIS GLEN COOPER

With the approaching dedication of Michigan's Isle Royale as America's first water-and-trail National Park, the National Park Service pledges itself to protect and preserve forever the superbly beautiful natural scenery and unique qualities that have made the "Jewel of Superior" worthy of its new status.

One of the most beautiful and easily accessible bits of virtually unspoiled wilderness east of the Rocky Mountains, Isle Royale lies in the northwestern part of Lake Superior about thirty miles from Port Arthur, Canada; fifty-five miles from Copper Harbor, Michigan, and one hundred and fifty miles from Duluth, Minnesota. Approximately forty-five miles long and from three to nine miles wide, it has an area of a little more than two hundred square miles. It is the center of an archipelago of one hundred and fifty islands ranging in size from less than one acre to more than two hundred acres.

The main island is made up of a series of sharp parallel ridges, the highest point being a little more than five hundred feet above Lake Superior. Clear inland lakes and streams in a setting of rugged forests, a wealth of plant and animal life, deep, quiet bays and rocky promontories, weird volcanic formations and erosional remnants, and dozens of small though equally picturesque islands, all surrounded by the sparkling, azure waters of Lake Superior, combine to form a picture of true scenic grandeur. No man-made roads mar the solemn dignity of the forests; no sounds destroy the quiet of the hills and valleys, save those made by creatures of the woods themselves.

A visit to Isle Royale is a thrilling experience to scientist, historian, or lover of the outdoors. The geologist finds in the rocks evidence of volcanic activity that took place ages ago in the earliest days of the earth's existence. During subsequent periods of submergence much sedimentary material was laid down, and copper was deposited in the underlying porous igneous rock. Crustal movements of the earth later caused the upturning of all these strata to form the ridges that today make up the fundamental structure of the island. Ages afterwards, sheets of ice of immense thickness, followed by the waters of huge glacial lakes, wrought changes in the island's contour, leaving caves, stack islands, terraces and beach lines to tell the story of these early conditions.

Eventually the island has become the home of such plants as inhabit the mainland on both sides of the lake. Animal life includes more than one hundred species of birds, as well as beavers, coyotes, squirrels and rabbits. Hundreds of moose roam the quiet pathways of the forest,

or wade in the tranquil waters of inland lakes. Perch, northern and wall-eyed pike, and lake and brook trout are abundant in Lake Superior and many of the inland lakes and streams.

Countless quiet, animal-made trails carpeted with velvety moss lead through acres of tall trees, beds of ferns, thimbleberry bushes, dogwood, bush honeysuckle and wildflowers in profusion. Rare orchids and wild asters, bluebells, buttercups and bunchberries, bright marsh marigolds, flaming orange lilies, and luscious, sweet-smelling wild strawberries are only a few of the many forms of plant life found on the island. More than twenty varieties of deciduous and coniferous trees have been identified, the dominant forms being balsam fir, paper birch and white spruce.

The rare archaeology of this island is one of its chief attractions. Long ago some aboriginal race of people dug extensively there for copper. While a number of theories have been advanced as to the identity of these early "miners," the evidence seems to indicate that most of the "mining" (digging, or excavating, would be more nearly correct) was done by ancestors of the Algonquin Indians; there is a possibility that Siouan and Iroquoian peoples also frequented the island.

One of the thrills to be enjoyed by the more intrepid visitor to Isle Royale today is a trip into the interior to areas where extensive prehistoric mining was carried on—areas that authorities class among the richest archaeological sites in the United States. Here, by careful searching, one can find pit mines left by this vanished race. As they have been filled with centuries of debris, they have become shallow, but excavations have disclosed several pits surprisingly large—considering the primitive implements and methods of the workers.

It is estimated that there are a thousand such pits in the area adjacent to McCargoe Cove alone. A little digging may uncover several "hammerstones", once used by the aborigines for cracking the copper-bearing rock. Knives, arrowheads, ancient fire-beds, pieces of pottery, camp sites, and human bones have also been found by various scientific expeditions. Even these, however, have not yet solved the identity of Isle Royale's early occupants.

Within historic times a number of copper companies have carried on work there, but they found that while the deposits were rich in quality, they were so limited in extent, and so difficult to mine, that their extraction was not profitable. The last copper mining ceased in 1892. The old mine shafts, dump heaps, and abandoned machinery, as well as the Rock Harbor Lighthouse—one of the best known landmarks on the island—can still be seen. Many interesting stories of the mining days add a certain atmosphere that makes exploration of these old remains intriguing and exciting.

Following this period, lumbering interests investigated the possibilities of carrying on operations, but the forest growth was found to be too stunted and difficult of access to merit much attention. Commercial fishing began, and soon a large number of fishermen were setting their nets around the island every summer.

WATERS ON THEIR WAY TO LAKE SUPERIOR
Here they tumble over a picturesque falls from Lake Siskiwit, one of the island's inland lakes

Scientists interested in the extensive prehistoric diggings discovered during the mining days, and campers drawn to the island by accounts of its invigorating climate, rugged scenery, unexcelled fishing, abundant wild life and the mystery surrounding its early days, found there a veritable paradise worthy of protection. To care for the increasing number of visitors several resorts with boat services were established, and Isle Royale began a new phase of its fascinating history. Today regular boat service connects the island with Duluth and Copper Harbor, Mich. The *S. S. Alabama* of Detroit also calls at the island as a feature of its cruise of the Great Lakes.

At Isle Royale, visitors find excellent accommodations at several resorts where boating, hiking, and excellent fishing keep one constantly and happily active. Another popular pastime is that of hunting for greenstones (chlorastrolites). These attractively marked, dark green, semi-precious gems, believed to be found nowhere else in the world but along some of the Isle Royale beaches, are very hard and take a high polish.

Recognizing the unique qualities of this primitive wilderness, and convinced that its beauties should be preserved, many interested persons for some time directed their energies towards making Isle Royale a National Park. This was finally authorized by Act of Congress in 1931. Before the federal government could take over the actual

A MOOSE AT A SALT LICK
One of the largest herds of moose is found on Isle Royale. Note the excellent condition of this animal, who has benefited by reduction of the herd and the increase in natural forage resulting from this control of numbers

management of the island it was necessary to acquire titles to all the land formerly owned by lumbering or mining companies, or private individuals.

During the summer of 1936 terrific forest fires devastated nearly one-fourth of Isle Royale's forest lands. The writer's investigations at that time confirmed his belief that the island was in need of modern fire-fighting equipment and trained conservation workers under competent leadership and centralized control. It has seemed that, although the fire-fighting or prevention activities should not become too obvious, thus destroying the wilderness atmosphere, nevertheless there should be trained men and equipment available to prevent a recurrence of the fires that several times have swept over the island.

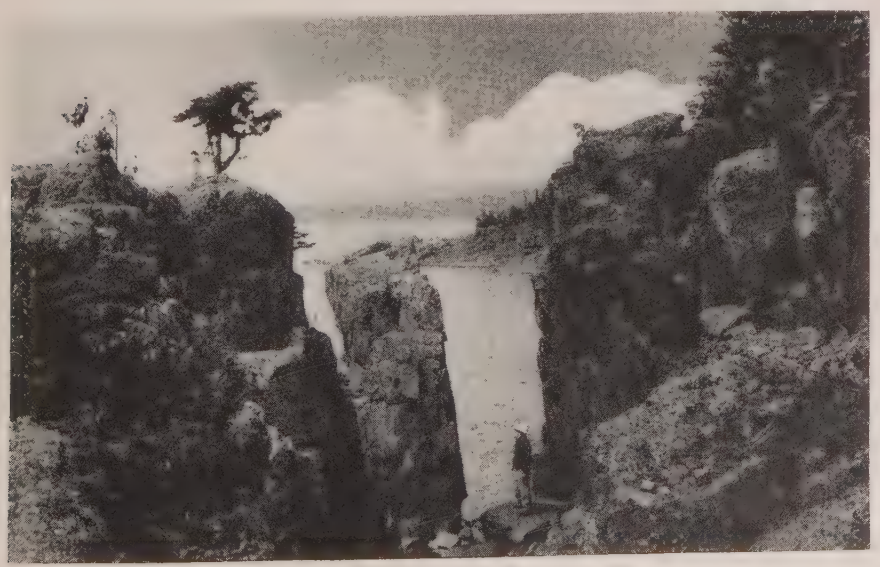
While the fires of 1936 unquestionably did much damage, they were a blessing in disguise to the Isle Royale moose population. These animals apparently gained access to the island sometime during the winter of 1912, when an ice bridge connected it with the Canadian mainland. In their new home the herd increased so rapidly that it eventually numbered several thousand. Little attention was paid to them until a few years ago, when they were found to be starving as a result of over-crowding, and only a few hundred of the splendid creatures remained. Finally a number of moose were live-trapped and liberated in Michigan. The fires of 1936 helped to remedy this desperate situation by burning over much dead material, thereby encouraging the growth of a new supply of the kinds of vegetation eaten by moose—ground hemlock or yew, balsam fir, aspen and willow.

During the past two years the number of moose has again increased. In the summer of 1938, the writer saw them in all parts of the island and was able to examine and photograph several beautiful specimens at close range. They looked to be in splendid condition—well fed, with smooth, glossy hair. Plenty of food and fewer moose is the reason for this. Should their numbers ever again become too great for the available food supply, the authorities will resort to live-trapping once more.

For the past two years the National Park Service, under the direction of George F. Baggley, formerly chief ranger of Yellowstone National Park, has been laying the groundwork for the permanent development of the area as a National Park. Trail planning and improvement have received a great deal of attention. Workers are clearing some of the fallen timber, erecting crude bridges, laying logs in strategic positions in swampy areas, and building substantial docks at trail take-offs, with the result that many beauty spots formerly difficult or impossible to reach have now been made accessible. However, the vast central section bordering Siskiwit Lake will be left trailless to make this an unequaled wildlife refuge.

For those who wish to be more or less alone, five widely separated camp sites will be established where fresh water facilities will be available. Water craft travelling about the island will be guided by spar buoys now being placed to mark channels and reefs; several lighthouses also will be erected.

The National Park Service does not intend to "develop" the island as a glorified playground; rather it is the desire and plan to keep it as Nature made it—a magnificent wilderness paradise. It will not be a place for those who enjoy only the atmosphere of the country club, or the sort of vaca-



A RUGGED SHORELINE
Wild and craggy Raspberry Island is typical of the character of the formation and scenery of Isle Royale

tion afforded by the conducted tour. Rather it is a spot for the true lover of the outdoors; one who revels in the wonders of Nature, unaided and unadorned by the so-called "advantages" of modern progress. There will be no roads, saddle horses, or automobiles on the island. Visitors will be carried about by small power launches and will explore the island by foot trails. Expert guides will be provided to explain the many unusual features of the island.

Ages and men have come and gone, but Isle Royale, far off the beaten track, has been barely touched and little changed by the mad rush of civilization, and we have the assurance of the National Park Service that every effort will be made to retain forever the scenic splendor and matchless primeval flavor peculiar to the terrain; that this masterpiece of Nature will be kept intact: a haven of beauty, charm, and mystery; aloof, ageless, enduring; and above all supremely worthy of the majestic name: "Isle Royale National Park."

•

Nyctia

By HEWSON SWIFT

The voice of the whip-poor-will is sounding once again,
Down where the larches cast their shadows on the pool,
Far, far from the city and hordes of driven men,
Where the evening wind blows cool.

The night is full of tiny sounds, of countless forms that creep
In among the brittle leaves of last year's summer sun,
To live their myriad lives beyond the shadow-forms of sleep,
And die when the year is done.

The night is wide and lonely where the stars stretch far away;
Far below, the white mist holds the fields in mystery,
And curving clouds of space stretch on beyond the bounds of day,
To darkness and to deep infinity.

The voice of the whip-poor-will is sounding once again,
To welcome in the coolness of another fragrant June,
And once again return the endless pangs of joy and pain,
Inwoven with one simple tune.

•

A Dwarf Rhododendron

By VICTOR H. RIES

RHODODENDRONS are beloved by all, especially after being seen growing wild, whether it be in the mountains of Pennsylvania, the hills of West Virginia, or the Smoky Mountains. Sooner or later almost every gardener attempts to grow them. But most rhododendrons, if they live and grow, soon become too large and tall. One that will not trouble in this way is a charming dwarf called Cunningham's White. It is easily grown, has excellent foliage, and gives a mass of white bloom in early summer.

Like all rhododendrons, this plant does best in an acid soil. So before you attempt to grow it, or any other acid-soil plant, it is best to test your soil, or have it tested by your County Agricultural Agent or your State Agricultural Experiment Station. There is no charge for this.

Your soil may be acidified by sulfur or aluminum sulfate. Sulfur is slower, taking about six months to act, but is safer if applied year after year. Aluminum sulfate is ideal for immediate results, but continuous applications may leave a toxic residue. The amount that is used depends on your soil. Normally it will take from one-fourth to one pound of sulfur per two square yards per year, or about twice that amount of aluminum sulfate.

PHOTOGRAPH BY JULIUS R. YOUNG

THOUSANDS SWARM THE BEACHES WAITING FOR THE SPAWNING GRUNIONS TO COME IN ON THE TIDE

Fires are built and beach parties feast on the fishes, which may be caught only by hand. Buckets, seines or other devices are prohibited, to protect the grunion from extinction

GRUNION RUN TONIGHT

By RAY G. FUNKHOUSER

"THERE'S a grunion run tonight," said the lad, by way of striking up a conversation.

He might as well have spoken in Piaute, for all the sentence meant to me.

"And what is a grunion, and what makes it run?" I asked, not overly curious.

I had just moved into a beach cabin, and the lad next door, a tanned healthy-looking specimen of about twelve, clad only in a pair of blue swimming trunks, had been eyeing me ever since I had stretched prone on the warm sand to absorb an ambitious quota of actinic rays. Half-dozing and lulled by the huge breakers, booming like muffled cannon roar, I was barely conscious that it was such a clear morning, although the isthmus indentation at Santa Catalina bit a sharp cut in the seascape. I was afraid that I had bitten on some boyish gag, and I waited for his hilarious denouement.

"You're from the East, aren't you?" he asked, instead of answering me. His tone indicated that that explained everything, and that my apology was already accepted. I acknowledged my shame.

"Grunion are fish. Fine to eat, too. At night they swim up on the beach and you can grab them with your hands."

"I was down here last night and I didn't stumble over any," I told him.

"The moon wasn't right last night. The moon has to be right before they come out. They'll be out tonight, all right. It said so in the paper this morning." He spoke earnestly, like an adult trying to convince a doubting, serious child. For wasn't I from the East, which apparently means any place on the other side of the purple, jagged mountains, and, therefore, wasn't I something of a tenderfoot, a landlubber, and a child whose ignorance would only be washed away by the waves?

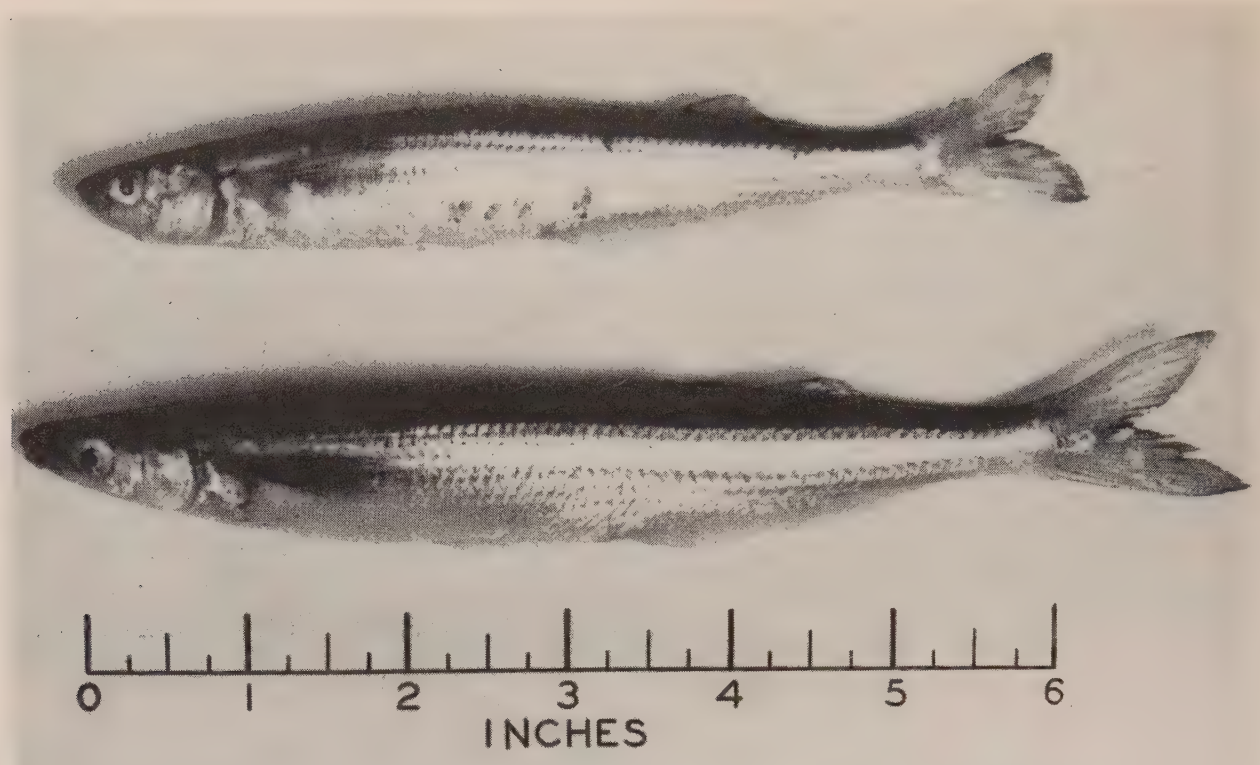
"It sounds like a sea-going snipe hunt," I told him, convinced he was secretly enjoying a grand jest.

"No, sir. Really, mister, they really do. You can pick them up with your hands."

He took his leave with an invitation, or rather, a challenge, to let him be my guide and mentor for the evening. At high tide my cabin porch was less than twenty-five yards from the water's edge and I would hardly need a guide to find my way to the ocean, even if I were from "back East", but I told him to whistle or call whenever he was ready.

Back in the cabin I went through the morning paper more carefully, and finally found a two-paragraph notice under a twelve-point headline to the effect that a grunion run was scheduled that night at about 9:12, and there was a warning issued by the state game and fish department that nets, dips, seines, buckets or other mechanical devices were prohibited, and that only hands legally could be used to catch them. The time, 9:12, like the arrival or departure of a train, interested me. I thought it must be an accommodating little fish who would announce to the minute the time to come and capture him.

After the sun had sunk behind Point Fermin, I slipped on a sweater, for the nights were chilly, and sprawled in the soft, comfortable swing seat. The moon, which had been full the night before, was luminous and bright as a pat of butter on dark blue velvet. For a mile or more, it seemed, down the beach I could see the feather edge of



PHOTOGRAPH BY EUGENE C. LAFOND. COURTESY SCRIPPS INSTITUTION OF OCEANOGRAPHY

THE SIZE OF THE MALE AND FEMALE GRUNIONS

Above is the male, which yields an inch or so in length to the female. The grunion, known scientifically as *Leuresthes tenuis*, is hyaline green with a bluish silvery lateral streak

breakers running out on the sand. Lights of the fleet twinkled, and officers carried on conversations by flashing signals. The beach had become more crowded than usual and a few driftwood fires burned blue on the sand.

Shortly before nine my guide arrived and said we had better get down there as it was about time for them. He handed me a cloth sack, suspiciously like the bag held in a snipe hunt. My skepticism had been allayed somewhat by the notice in the paper.

We came back an hour later, empty-handed. There were no grunions that night, but it was consoling, at least, that I was not the only bag-holder, for up and down the beach were hundreds of other bag- and bucket-holders.

I was disappointed, but my little friend was doubly so, for he was not only without grunions, but without proof of the tale he boasted he could prove. Profusely, he apologized for the grunions.

"Something was wrong. They were supposed to come in. You saw that in the paper. We can probably get some tomorrow night, they are sure to come in then. Really, mister, there really are grunions. You can ask anybody. That's why all those people were down here." I felt a little sorry for him, he was so sincere about it all.

Next night, together we caught more than a hundred of the little beach dancers, and I found it no trouble to eat about twenty of them at one sitting. We fried ours crisp at the cabin. On the beach parties were busy over their driftwood fires or oil burners, some catching and others cooking.

Since then, I have observed several score grunion runs.

Predicting grunion runs almost to the minute seems something of a mystery to the uninitiated, but when one knows their habits it is simple. All one needs to know is the time and the height of tides, and many calendars have these printed on them. Since grunions spawn only at night, the day tides can be disregarded. Tide height reaches peaks at fourteen-day intervals, once at the full of the moon, and again at its dark. The forecasting of the hour and minute when grunions will run is reached by adding fifteen minutes to the time the tide reaches its nightly peak. In other words, there is a lag, or margin of safety; they come ashore just after the turn of the tide, and on nights when the tide reaches a little less high than on the preceding night.

Scientifically, the grunion is named *Leuresthes tenuis*, of the family Atherinidae, or silversides. It is often incorrectly classed as a smelt. One marine fish reference book devotes to it less than a half page of type and illustration in which the grunion is described meagerly as "color, clear hyaline green, with bluish lateral silvery streak. Length to 7 inches. Female buries itself taildown in the sand up to the pectoral fins and eggs spawned in pocket."

There is no reference to George Grunion, who, I am sorry to report, is a cad; his worst crime is kissing and running away, so to speak. He deserts his mate when she is weakened and easy to catch. He actually gets up from his marriage bed and skitters frivolously back to the ocean, leaving her exhausted and dependent on a few feeble flips and the next wave to reach the safety of the sea.

The marriage and reproduction cycle of the grunion is

PHOTOGRAPH BY EUGENE C. LAFOND. COURTESY SCRIPPS INSTITUTION OF OCEANOGRAPHY

A MASS OF GRUNIONS ON THE BEACH

The next wave, which will carry the fishes back into the sea, may be seen approaching the beach. White spots in background are the street lights of La Jolla. Picture taken at midnight

one of the most unusual in Nature. The recreating instinct of the male and the egg-laying mechanism of the female are synchronized to the moon and tides. Beginning in March and continuing on through August, she ripens a batch of eggs at fourteen-day intervals. She is ready to deposit her eggs ashore just as the series of high tides begins to abate, and about fifteen minutes after the high tide of the night begins to ebb. About every sixth or seventh wave is larger than those preceding, and the grunions ride these in as far upon the beach as they can. When the water recedes pairs appear to be dancing a shameless, wanton rigadoon on their tails. Gerty Grunion is scooping out a pocket in the sand and extruding a cluster of orange-colored eggs, each about the size of a very small pinhead. George Grunion lovingly arches himself around his mate, fertilizing the eggs in the pocket. Then, with the zip and baffling zig-zag of a frog in a marsh, he slithers back into the water. Their lovelife is begun and consummated in less than a half-minute.

If they escape the gauntlet of grasping hands, they continue spawning every fourteen-day period, when the moon is full and again in the dark of the moon. And hand-catching assures the return of plenty fishes.

By the time the next series of high tides is due the eggs are ready to hatch. However, they do not hatch until the waves actually erode the beach and uncover them. The eggs can remain buried in the sand through a thirty-day period, should the next series of tides fail to reach and uncover them.

The grunion is found nowhere else in the world except along the coast of southern California, from Ventura County to the northern part of Baja California.

Because the grunion faced extinction, or near extinction, the California Fish and Game Department took measures to protect it. The season was closed during March, April, May and June, the months when the runs are heaviest. Methods of catching them were limited to hands only. Nets, dips, seines, buckets and other devices were prohibited. There is no commercial fishing for the fish. However, the total poundage taken, if it were possible to compute it, would reach an astounding total, for on nights grunions are scheduled to run thousands upon thousands of persons line the beaches to hand-catch the little fishes. In the days before the automobile became so popular, interurban lines running out of Los Angeles to the beaches exploited them and ran full-page advertisements in the papers announcing the runs. Thousands rode from the city to the ocean to diminish further the grunion population.

Although the nights and the times of the runs can be predicted accurately, there is no method to forecast just which beaches will be hosts to them. Apparently they do not have the salmon instinct to return to their place of birth.

In the summer of 1939 the open season runs were not heavy near the centers of population. Consequently, it is believed that millions of them have spawned many more millions of eggs, presaging a great increase in the grunion population this season. Grunions hatched in any summer will spawn during the next spring and summer.

"ONE RED ROSE"

By MAUD MACDONALD HUTCHESON

It was asked as rent for land, and is typical of other interesting tokens of earlier days

ONE RED ROSE payable "yearly forever hereafter, if the same shall be lawfully demanded"—this was the rent that Henry William Stiegel decreed in 1772 for the land he gave to the Zion Lutheran Church in Manheim, Pennsylvania.

With fitting ceremonial the church tenders this payment on the second Sunday of June at Manheim's Festival of the Red Rose, and the observance holds an honored place among America's native traditions.

Only twice was the rose presented to the benefactor himself—in 1773 and 1774. Then he found himself beset by business difficulties and was obliged to leave the town he had founded. The poetic stipulation was forgotten, and the dust of 120 years had gathered on the old deed when it was rediscovered in 1891 by Dr. J. H. Sieling. This country physician had the love of lore and legend that pays respectful attention to old folks' tales. As he went his rounds he heard many stories concerning an Eighteenth Century emigrant from the Rhine country—Henry William Stiegel—who lived in such magnificence that local tradition long since created him "Baron." "In contrast with the simple habits of his neighbors," says a recent biographer (George L. Heiges) Stiegel "lived in baronial splendor." In the finest mediaeval tradition he was the Lord of the Manor, and the title he earned, and the ground rent he asked, fits perfectly into the feudal picture.

It was virtually a castle that this man of ambition and high ideals built for himself on a hill overlooking Elizabeth Furnace, which turned out Stiegel stoves in large numbers. A coach and four, with dashing outriders, made a brilliant equipage for this master-manufacturer. His comings and goings were announced by the firing of a signal gun from the roof of the mansion. There, too, a band of musicians would play when "Baron" Stiegel was mine host. Before the church was built, it is said, he had his workmen and others assemble in his private chapel to learn the Lutheran doctrines.

AS RENT—ONE ROSE

The land upon which this early church was built was given by Henry William Stiegel, feudal "baron" of the day

Such a tale is like an echo from those long-gone days when the feudal lord reckoned his wealth in land. The "rent" he collected from his villeins, or tenants, was remitted in the form of produce, while vassal knights paid for some special privilege with a romantic fee. At Eastertide, and other stated periods in the year, the tenants gathered in the great hall of the Manor, bringing eggs, chickens, fish, and other supplies, in proportion to the size of their holdings. "Godfrey of Boynton", we know, rendered "forty-four and a half eggs"—this being part payment for that number of acres!

It was the rise of the middle

class in the late 1300's that put produce payments out of commission and made money the gauge of value rather than land. The feudal system, however, which had lived long, was to die hard. Sanctified by centuries, the custom of collecting feudal fees is a heritage of our own times. As feudal lord of the Duchy of Cornwall, for instance, King George VI receives in person, or by deputy, such dues for ancient manorlands as—two white greyhounds, a salmon spear, posies of herbs, gilt spurs, a silver-tipped bow of alderwood, a pound of pepper in a dish, and a gray riding cloak.

It will be remembered, too, that when the British sovereigns visited Canada last year the Hudson's Bay Company presented His Majesty with two black beaver skins and two elk heads. Such was the "rent" stipulated in the Charter granted by the Crown to the Company in 1670.

READY TO PAY FEUDAL FEES TO KING GEORGE VI

Two white greyhounds, a salmon spear, posies of herbs, gilt spurs, a silver-tipped bow of alderwood, a pound of pepper in a dish, and a gray riding cloak were the dues of Cornwall

Another new world Charter into which a picturesque fee was incorporated is that of Maryland. In part payment for Terra Maria—according to the grant given Lord Baltimore in 1632—he was to "yield unto Us, our heirs and successors, Two Indian Arrows of those parts to be delivered at the Said Castle of Windsor, every year, on Tuesday in Easter week, and also the fifth part of all Gold and Silver Ore which shall happen from time to time to be found within the aforesaid limits."

As far as is known, Maryland's proprietors never carried out this provision. Foodstuffs, more precious than minerals, have comprised the wealth of Maryland's soil. Besides, how would one set about obtaining "Two Indian Arrows of those parts" today? In the time of King Charles I they were more plentiful.

A flower, of course, is a more simplified matter. The rose used to discharge the Manheim payment is taken from the church's rose garden, which the Brotherhood of the Congregation planted in 1934. In that year it was presented, on behalf of the congregation, by Associate Justice Owen Roberts of the United States Supreme Court. Some eminent attorney is always asked to act as the church's agent.

Since the ceremony was revived in 1891 descendants of the Stiegel clan have been present to accept payment in the role of heirs. An historical address is delivered by an outstanding Pennsylvanian, a distinguished preacher occupies the pulpit, special music is played and the red rose window in the chancel recess colors the scene with ruby light. Built into the new church, which was under construction in 1891, the window is a memorial to Stiegel. It represents the initial effort to revive Manheim's Feast of the Roses, which became the Festival of the Red Rose, and an outstanding Lancaster County event, in 1937.

The rose, with its brief brilliance and fragrant memories, is in a sense symbolic of Henry William Stiegel's own life. Meteoric success was followed by staggering loss. Stiegel stoves made his name a household word, and when he began glass manufacturing in 1764 he was practically sole owner of the town of Manheim. Stiegel glass survives in glowing jewel shades—ruby, sapphire, amethyst, amber, emerald, and a pale green that recalls sea water. The decoration of this exquisite ware favors the world of Nature—doves, lovebirds, floral designs, dogs, and even cows being found in the patterns.

The 1760's were a perilous time, and it was then that the tide of fortune, which had been at the flood for "Baron" Stiegel, began to ebb. He became bankrupt and even knew the indignity of a debtors' prison for some weeks. But he was one of those who "fall to rise again". Instead of losing his spirit he turned to the first thing at hand. This was teaching, and he had spent several years in the humble role of village school master when his eventful life came to a close. He was only 56 when he passed from the scene of his triumphs and defeats in 1785.

His burial place is unknown, but a nation joins Manheim in remembering him when the red rose ceremony is observed on the second Sunday of June.

It is more than passing strange that Manheim should be situated in Lancaster County—a name enshrined in roses. Under the Red Rose of Lancaster and the White Rose of York England waged the bitter Wars of the Roses, which spelled the doom of the feudal system and gave the Tudors their chance.

Shakespeare, in *Henry VI,* has painted an immortal picture of that scene in the Temple Garden, where Richard Plantagenet plucked a white rose "from off this brier"

and the Earl of Somerset seized a red rose from the same bush. It took a love match and a royal wedding to end the 30-year quarrel—the union of the Yorkish Princess Elizabeth with Henry Tudor of the Lancastrian line. He became King Henry VII.

Since earliest times the rose has been of royal lineage. No other member of the floral family can vie with it in importance. Favored in my lady's bower, it flourishes on the field of battle, too, and while speaking the language of lovers, is yet the banner under which men have spilled blood. In the Age of Chivalry there was an Order of the Rose, under which knights went forth to "deeds of derring do." A rose embroidered on their sleeves was their emblem—symbol of the gentleness that is allied to courage; the promise of beauty's reward to valor.

To that same age of barons bold belongs the original best-seller—The Romance of the Rose. This allegorical poem, which presents the love philosophy of the troubadours, exerted an influence upon the Middle Ages that was tremendous. Imitation being the sincerest form of flattery, *Le Roman de la Rose* set the literary style for centuries and established the vogue for allegory in all countries. In that pre-copyright era, when the same theme was common property, every wielder of the pen had a try at a version. Some idea of the poem's popularity may be gauged from the fact that two hundred copies have survived in manuscript form—each line laboriously written by hand—and there are 23,000 of them!

PHOTOGRAPH BY EDGAR M. SACHS

PRESENTING THE TOKEN ROSE

Judge Christian E. Charles of Lancaster hands it to Mrs. Bessie Boyer Van Tassel of Newtonville, Mass., a direct descendant of William Henry Stiegel

STRANGE BUT TRUE

THIS IS the story of a homing pigeon that did things in the reverse. It is a story of a happening in Nature that does not conform to accepted ideas. It defies explanation, but it has been carefully investigated and authenticated.

The story starts in the fall of 1939 when Hugh Brady Perkins, twelve-year-old son of Sheriff F. C. Perkins of Summerville, West Virginia, befriended an exhausted homing pigeon bearing a pigeon-racing band. Boy and bird guest became close friends. A few months after this friendship started, Hugh Brady was taken to the hospital in Phillipi, West Virginia, 105 miles from his home. The pigeon, now named Billy, was left at home, and was still there ten days after the boy left.

The scene shifts to the hospital room at Phillipi. The nurse came into Hugh's room one morning and her young patient said that there was a pigeon on the window sill. It had awakened the boy at one o'clock by scratching on the pane. The nurse opened the window. The pigeon was still there, and walked into the room.

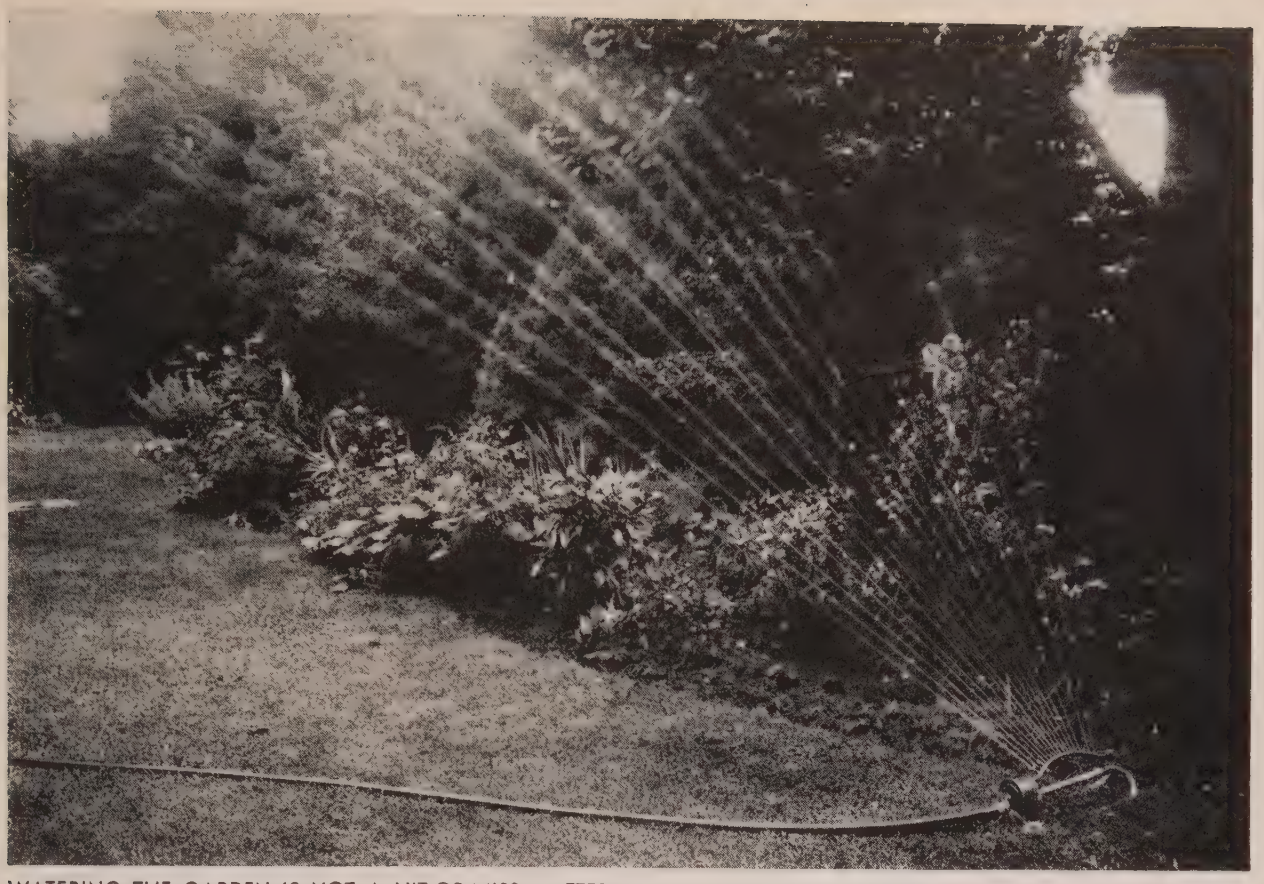
"Why, that's my pigeon—Billy," declared the boy.

The nurse suspected delirium. But the boy insisted that she look at the leg band and see whether it did not have 167 on it. It did—AU 39 C&W 167. It *was* Billy. When Sheriff and Mrs. Perkins came, a couple of days later, they did so with the task of reporting that Billy had gone.

HUGH BRADY PERKINS AND THE HOMING PIGEON THAT FOLLOWED HIM TO HIS HOSPITAL ROOM

"He's all right," said Hugh Brady, "he's here with me." He pointed to a pasteboard box where Billy had taken up his temporary hospital abode.

Both the nurse and Hugh Brady's Dad, as well, of course, as the young man himself, attest to the truth of this occurrence. The only thing that worried Hugh Brady was that a story about Billy might lead the original owner to claim the bird. From our experience a pigeon racer whose bird has strayed does not seem to care about having him back, and, anyway, it looks to us as though it is Hugh Brady's bird, and that Hugh Brady is Billy's boy.



WATERING THE GARDEN IS NOT A HIT-OR-MISS MATTER

Varieties of plants require differing considerations and too little watering is often much worse than none at all. If you will have success with flowers, trees, shrubs, vegetables and lawns, use water and common sense

Safe and Sane Watering

By ADOLPH KRUHM

PLANT LIFE depends primarily on three factors—soil, moisture, and sunshine. To be sure, scientists have told us recently that soil may become superfluous, and we know that some plants do not need sun to thrive. So far, however, all agree that they need water, for ninety per cent or more of all vegetation (except trees) is water! Water is the life line of the plant. It is what helps it to get food out of the soil, or in whatever else it may grow. Since this is no brief for water culture—still in its experimental, scientific stage—I would rather tell you about watering your garden.

The next few months may see many gardeners neglect their rooted friends. Vacations may be responsible, but if you love your garden, have somebody attend to the watering—and do it correctly.

Correct watering requires careful consideration of lawn, shrubbery, flowering plants and trees. All require different treatment but have one thing in common—the water should go down to the roots. Don't be satisfied until the soil is soaked to a depth of three or four inches. Plants feed through their roots. Given plenty of water below it matters little how dry the top of the soil may be. As a matter of fact, cultivating the garden soil by creating a dust mulch helps the plants more than merely sprinkling the surface. And a dust mulch of finely-crumbled soil prevents the evaporation of moisture that constantly rises to the surface. That, however, is a phase of gardening to be dealt with at another time.

Superficial watering of the surface of any part of the garden is just a waste of time and water. This is particularly so in the case of lawns. Better by far give them a thorough soaking once a week than "sprinkle" a little each evening. Wetting the surface of any part of the garden, including the lawn, creates a tendency in the roots to turn up towards moisture. This applies equally to all plants, shrubs and trees.

Watering the vegetable garden deserves special consideration. Here are a variety of plants calling for distinct methods of watering. These may be divided into three broad classes: those whose foliage we eat, those grown for their roots, and the fruit-bearing kinds. The crops grown for their foliage—lettuce and spinach for example—want plenty of water within the limited time of their development. The root crops can take it in deferred installments. Neither of these two classes care how moisture reaches them as long as it does. You may water the plants, or place the hose between the rows.

However, there are certain garden inhabitants that re-

sent being watered or sprinkled from above. These are the fruit-bearing kinds, such as tomatoes, peppers, beans, and the like. Most of them originated in semi-tropical climates. In the case of tomatoes, peppers, and eggplants, the use of a hose on the plants will surely wash away the pollen of the flowers. Without pollen, flowers will not set fruit. To wet the foliage of beans invites the spread of fungus diseases. And none of these plants appreciates chilly baths—put the water between the rows and they will be much happier and bear better crops.

As long as things grow normally we are apt to fuss continually about rainy days, spoiled weekends and wrecked picnics. But when lawns burn up and young dahlias hang their heads, when newly-transplanted seedlings die and lettuce refuses to "head", then we realize how grateful we should be for rain. And the biggest sufferers in drought are the permanent inhabitants of our gardens, the shrubs and trees. They should be given thorough watering at regular intervals, especially if they happen to live alongside cement pavements. I have seen forsythias and hydrangeas suffer to the point where I walked to the owner's door and called their attention to the plant's need of water. And frequently I had occasion to call their attention to another faulty factor—or shall I call it misdirected effort? Of all the malpractices in gardening the "hilling" of plants, shrubs and trees is the most nefarious.

Why hill a plant? The hills surrounding hedges and shrubs in our suburbs shed the water, cause it to run away from the plants instead of going down alongside of them. Some years ago, in the parks of Vienna, I had a chance to study the effects of the entirely opposite treatment. There, every hedge, shrub and tree had a basin around its base, rimmed to catch and hold the moisture.

With us on Long Island the watering of trees and shrubs presents a great problem. Our soil is a sieve, having Atlantic Ocean gravel for a base. Evergreens have to be watered by the hour. Where the water is not metered, it is best done by putting the hose on the ground and letting the water run until the soil is soaked. Two hours of steady flow is none too long to make a fifteen-foot spruce look brighter the next day.

The best time of day to water is, of course, after sunset. Sprinkling while the sun shines entails some waste of precious moisture by way of rapid evaporation. Man's ingenuity has perfected many watering devices, the correct use of which saves labor and increases garden crops and pleasures. Summarizing: If you have to water, do it long enough. To do any good, moisture must reach beneath the surface. Unless the soil is broken up, to enable the roots to get food, your watering efforts are wasted.

•

Between the time that the rotogravure section that begins on the next page had gone to press, and press time of this issue of Nature Magazine, Dr. W. Dwight Pierce, Curator of Entomology at the Los Angeles Museum, was able to give further study to the insect pictured and described by George Elwood Jenks in the feature "Dwarfs that Live in Their Hats." Further research revealed that Mr. Jenks had discovered a new species, which is now named, in his honor, *Exema jenksi*. This name supersedes the temporary identification recorded on the fourth page of the rotogravure section.

•

Sequoia Sempervirens

By SISTER M. PASCAL

They say God walks in gardens; I know He walks in woods—
A'down dim aisles of redwoods old, where a silence holy broods,
And sunlight filters only through the lace-like roof on high,
That crowns the ancient pillars, towering to meet the sky.
O guardians eternal, long centuries thy shade,
Lush with spicy incense, His sanctuary made;
And there I knew Him yestermorn—His power, His majesty,
Reflected in thy red-brown trunk, O mighty redwood tree—
Reflected in thy graceful poise, in wood-folk awed to silence,
In joy that in my soul shall bide, like redwoods—sempervirens!

Dwarfs That Live in Their Hats

By GEORGE ELWOOD JENKS

Photographs copyrighted by the Author

Wherever man may dwell, his environment is made up of a series of worlds within worlds, endlessly diminishing in size, all teeming with strange and fantastic life. And, just at the borderland, where denizens of miniature worlds begin to vanish from human unaided sight, lie the worlds of the enchanted weedlands. To enter and explore these fascinating realms we need only a magic looking-glass—just a little hand lens. So we will focus our magnifying periscope on the fuzzy twigs of the California sagebrush, and, if we are lucky, we may see some . . .

. . . weird little objects standing motionless upon a fuzzy sage branch, and looking for all the world like discarded hats of the "Seven Dwarfs". Here we see two of these strange little hats, odd growths on the host plant. We touch one of them lightly with a blade of grass, and . . .

. . . it comes to life . . . bobbing away on twinkling feet, like a small boy under an inverted barrel! But we will find that this is the larval stage, and so we must go back to where the life story of the Dwarf begins, in . . .

. . . a microscopic egg so small that the pinhead that we see at the right is huge in comparison. But the tiny mother that lays the pearly egg does not leave it loose and unprotected. By no means, she . . .

. . . makes sure that the egg is securely anchored upon a strong and flexible "stem", but, even so, what a dainty and tempting morsel for some hungry, predatory insect! But—the little mother has only started!

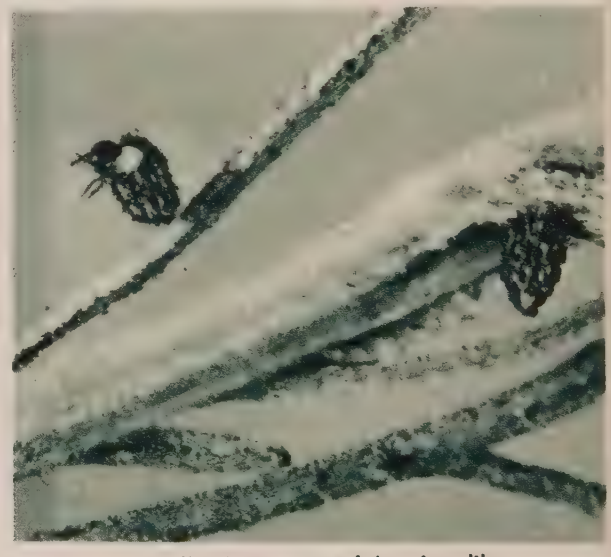
Beginning at the stem, and using a fibrous paste compounded within her own body, she moulds a protective chalice about the delicate egg—using a flexible "faucet" tube similar in action to the spinneret of the spider.

The little mother spreads the "frosting" over the birthday egg-cake. We may marvel at Chemurgy, but myriad species of insects have been performing miracles with waste products since the dinosaurs were pups!

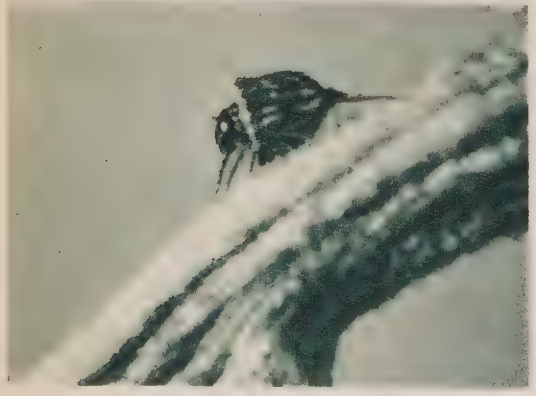
A modern scientist eats his potatoes, transforms the tops into a suit of clothes, and thinks he has done something. This tiny beetle eats sage leaves, compounds a paste from the fibrous waste to make a tough plaster-board for her baby's nursery. Then she seals the chalice with a synthetic paraffin cap, and calls it a day.

But the daintily-moulded chalice also serves as an ideal protective disguise. Just imagine, for a moment, that you were a hungry, predatory insect. Would *you* ever dream that this pretty "bell flower" contained a tasty and refreshing egg-nog? Yet, on the insect menu, that is what it would be.

Here the little mother made a serious mistake, and attached the egg to hubby's shoulder. Or *was* it a mistake? Possibly she did not like the idea that "Everybody worked but Father", and so—! Anyway hubby must have been a sound sleeper. But wherever the egg may be laid, it soon hatches . . .



. . . and the baby pops into view like a microscopic jack-in-the box. His "arms" wave wildly in the air as he struggles and stretches to reach the twig below. Sooner or later he manages to get a handhold, and . . .



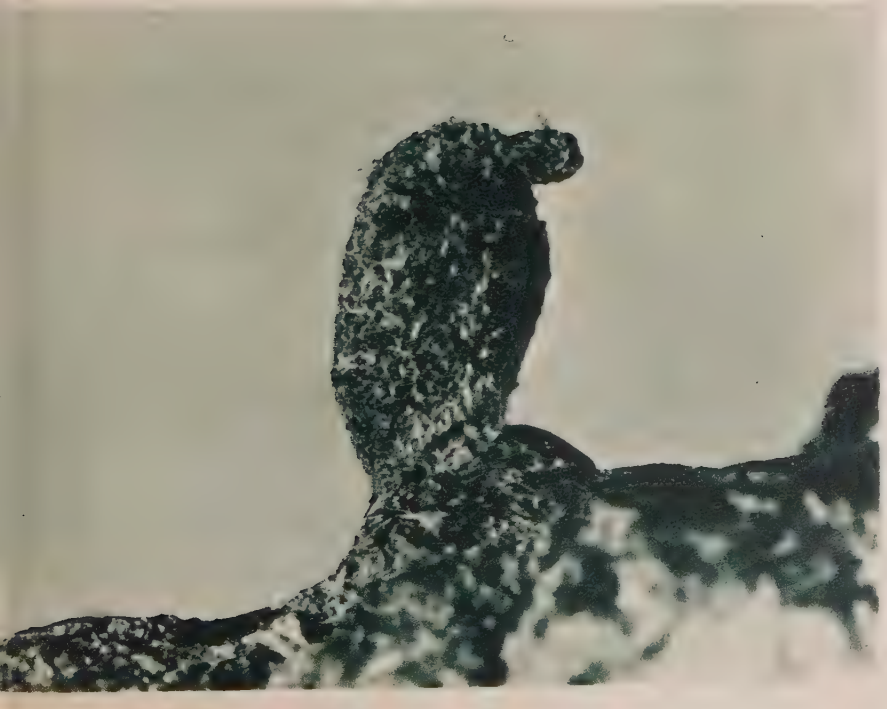
. . . pulls himself down to the twig. Does he slip out of his cradle and run away? No, he clings fast to it; tugs and jerks until he breaks the anchoring stem. Then he upends his cradle, and it becomes his first tiny hat-house, in which he lives and moves as he feeds upon the tender leaves of the sagebrush. As he grows his "hat" grows too. He, too, can manufacture fibre plaster-board to enlarge his house, even if it is crude and rough. And so the hat grows day by day, the outgrown cradle remaining as the "tassel" of the stocking hat. Now we will . . .

. . . cut away the side of the house to reveal the humpbacked dwarf that lives in his hat. What an example of perfect efficiency! The food vitamins of the sage are utilized for his growth and development, while the indigestible fibres are combined to form the paste with which he "spins" his plaster-board house. At the same time, he is "spinning his cocoon", for . . .

. . . when the larval dwarf is ready to pupate, all he has to do is to lay a plaster-board "floor." This done, his hat becomes a perfect cocoon that remains safely stuck to the leaf or twig of the plant that this insect seems to like best of all, while . . .

. . . the larva is slowly transformed into a pupa . . . and . . .

. . . then the pupa develops into an adult beetle.



The "hat" cocoon, shot just as the adult dwarf was cutting its way out from within! (This was one of my luck-of-a-lifetime shots. I was focusing for a simple photograph of a cocoon when I discovered, all unexpectedly, that the beetle was just in the act of cutting off the cap to emerge.)

The severed cap flies off, and out struggles the adult beetle—a fat black Santa Claus emerging from a miniature chimney no larger in diameter than the head of a pin!

As an adult, our dwarf is not much for looks, but he is safe. He has just reached the ultimate in protective modeling and coloration. He looks exactly like the "dropping" of a small caterpillar!

And, if you do not believe that this unflattering resemblance provides a perfect camouflage, just imagine once more that you are a hungry, predatory insect, and tell us which "beetle" you would bite into first! There are three beetles and three caterpillar droppings in the picture.

And, finally, who is this fellow? It belongs to a rare and little-known group of which three species are known to exist in the United States. Specimens studied by W. Dwight Pierce, Curator of Entomology at Los Angeles Museum, have been determined as a new form, which he is describing as *Exema dispar jenksi*. Dr. Pierce says that this is the first complete life history recorded for any species of the genus *Exema*.

Atlantic and Gulf Coast Shells

The tenth in Nature Magazine's series of educational inserts

By E. LAURENCE PALMER

REPRESENTING some of the more interesting specimens, the shells shown on the plates in this insert were collected by the author and his wife along the Atlantic Coast from Maine to Florida.

Suggestions for the collection, cleaning and preservation of shells are given on the School Page of this number of NATURE MAGAZINE.

It is proposed that this insert will be followed later by a similar treatment of the Pacific Coast shells, collections of these having already been made for this purpose. Not a few of the shells shown in this insert may be found on the Pacific Coast, and close relatives of still others may be found there. Thus the present insert should have value to West Coast readers as it is.

As is the case with other inserts of this series, this article is an elaboration and a modification of a similar article dealing with the sea prepared by the author and published by the New York State College of Agriculture at Cornell University as a number of the *Cornell Rural School Leaflet*. Appreciation is expressed to the college for permission to rewrite this material. Other references that helped in studying these shells, and which should be useful to shell students generally, follow. To them the author acknowledges his appreciation. In general, the nomenclature followed is that used by Charles W. Johnson in his *List of Marine Mollusca of the Atlantic Coast from Labrador to Texas,* published in 1934 as volume 40, number 1 of the Proceedings of the Boston Society of Natural History. The photographs are by Dr. Katherine V. W. Palmer.

Marine Shells of the Florida Southwest Coast by Louise M. Perry. Paleontological Research Institution, Ithaca, New York. 1940. The most useful reference on animal behavior.

East-coast Marine Shells by Maxwell Smith. Edwards Brothers, Ann Arbor, Michigan. 1937.

The Sea-beach at Ebb-tide by Augusta Foote Arnold. The Century Company, New York. 1901.

The Shell Book by Julia Ellen Rogers. Doubleday, Page and Company, New York. 1908.

Florida Sea Shells by Bertha Aldrich and Ethel Snyder. Houghton Mifflin Company, New York. 1936.

What Shell is That? by Percy A. Morris. D. Appleton-Century Company, New York. 1939.

Manual of the Common Invertebrate Animals Exclusive of the Insects by Henry Sherring Pratt. P. Blakiston's Son and Company, Philadelphia. 1935.

The Pelecypods or Bivalves

(Plates 1 and 2, pages 342 and 343)

The shells of these animals are to be found in the shallower fresh or salt waters of the world. They are valuable as indicators of ancient shorelines. As fossils, they are found imbedded in the rocks of some of our higher mountains, deposited there when the mountains were at sea level. Their trails in the muds and sands intrigue us. The pearls that may be developed within them dazzle us. The soft parts of the bodies of some of them are delicious. Their shells, made into buttons, are useful in holding our clothing around our bodies. They are important in road building. They were used by primitive peoples as weapons, as skin scrapers, as agricultural implements and as vessels for holding food. Some of them have been used as media of exchange; some, in the making of wampum and as ornaments.

In 1937, oysters as food in the United States and Alaska yielded $8,703,000 and clams $3,112,000, the former exceeding in value any fish, except the salmon and tuna. Returns from the latter just about matched those from cod.

The shells of pelecypods are abundant in the midden heaps of ancient peoples. Musical instruments, ornaments and utensils made of the shells of pelecypods are abundant in the midden heaps of American Indians in the West, middle West and the East. Other midden heaps still are being made by minks, otters and muskrats. Many of the fresh-water pelecypods are eaten, shells and all, by otters, but the minks and muskrats usually open the shells and eat only the soft animal within.

Many modifications are found in animals to help them get the shellfish they use as food. These may be mouths paved with bony plates to crush the animals; ghastly-looking teeth, such as are found on sheepshead; great teeth, like those of the walruses, which tear the animals free from the bottom.

It is only natural that those interested seriously in the study of shells should have named the various parts of shells to assist in making descriptions. Almost any zoology text will provide this information. This applies also to most of the details concerned with the soft parts of the animal. However, the casual student of shells should know something of what makes the animal behave as it does.

If a bivalve such as a clam has one shell broken, a thin tissue, the mantle, will be seen to enclose the soft interior. Near the opening, between the shells, this mantle may, in some pelecypods, be brilliantly-colored, fringed, fluted and attractive. Through this part of the mantle will appear two openings; one for the siphon through which a stream of water enters the animal; the other for the siphon through which the waste water is discharged. The length and shape of these siphons vary greatly in the different species.

Another opening in the mantle enclosing the soft parts of a pelecypod permits the extension of the muscle, or so-called foot. With the single foot most of these animals possess, they are able to push their bodies along the bottom. Often this leaves a conspicuous trail in the mud or sand. In some cases, the animal is able to move the foot quickly so that movement by a series of sudden jerks and leaps is possible.

In a number of bivalves, the edge of the mantle is marked with sensory organs detecting light and serving as eyes. A moving shadow may cause sudden changes in the position of living bivalves thus provided. There may be conspicuous flapping movement, or merely withdrawal of the soft part into the protection of the shells.

The mantle, foot, and the siphons are all soft parts and may be protruded from between the hard shells of the living animals. Some have another external structure with which they attach themselves to the bottom or other permanent support. This "byssus" is particularly evident in the mussels.

The pelecypods figured on pages 342 and 343 are as follows:

FAMILY ARCIDAE. The members of this family have comb-like teeth in rows on the hinge. The foot is large and the mantle-edges bear a row of eyes. The shells are relatively heavy and have a thick velvety or hairy covering or epidermis, which wears off variously in the dead shells. The family is an ancient one. It is represented by many fossils. Its largest species is to be found at Panama, and in India there is a species that lives in the Ganges River hundreds of miles from the sea.

1. Black Ark, Widow or Ponderous Ark. *Noetia ponderosa.* Length, 2 to 2½ inches. Shell, heavy, swollen, with about 32 flattened, radiating ribs; yellowish-white, with a dark shaggy cover. Interior, yellowish-white, but white and glossy at the edge. Massachusetts to Florida and Texas, being exceedingly abundant on beaches in the southern part of its range.

2. Ark Shell. *Arca campechiensis.* This is called the "bloody clam" because of its red blood. It varies greatly with the environment, being largest at Cape Cod. The shell is 2 to 2½ inches long with a height of 2 inches. The ribs of the left valve are commonly flatter and narrower than those of the right. The species occurs from Massachusetts to Texas; common on Long Island and New Jersey coast. The variety *pexata* is found from Massachusetts to North Carolina.

3. Ark Shell. *Arca transversa.* Length, 1½ to 2 inches; width, about the same; height, ⅔ the length. Brown. Ribs, about 35,

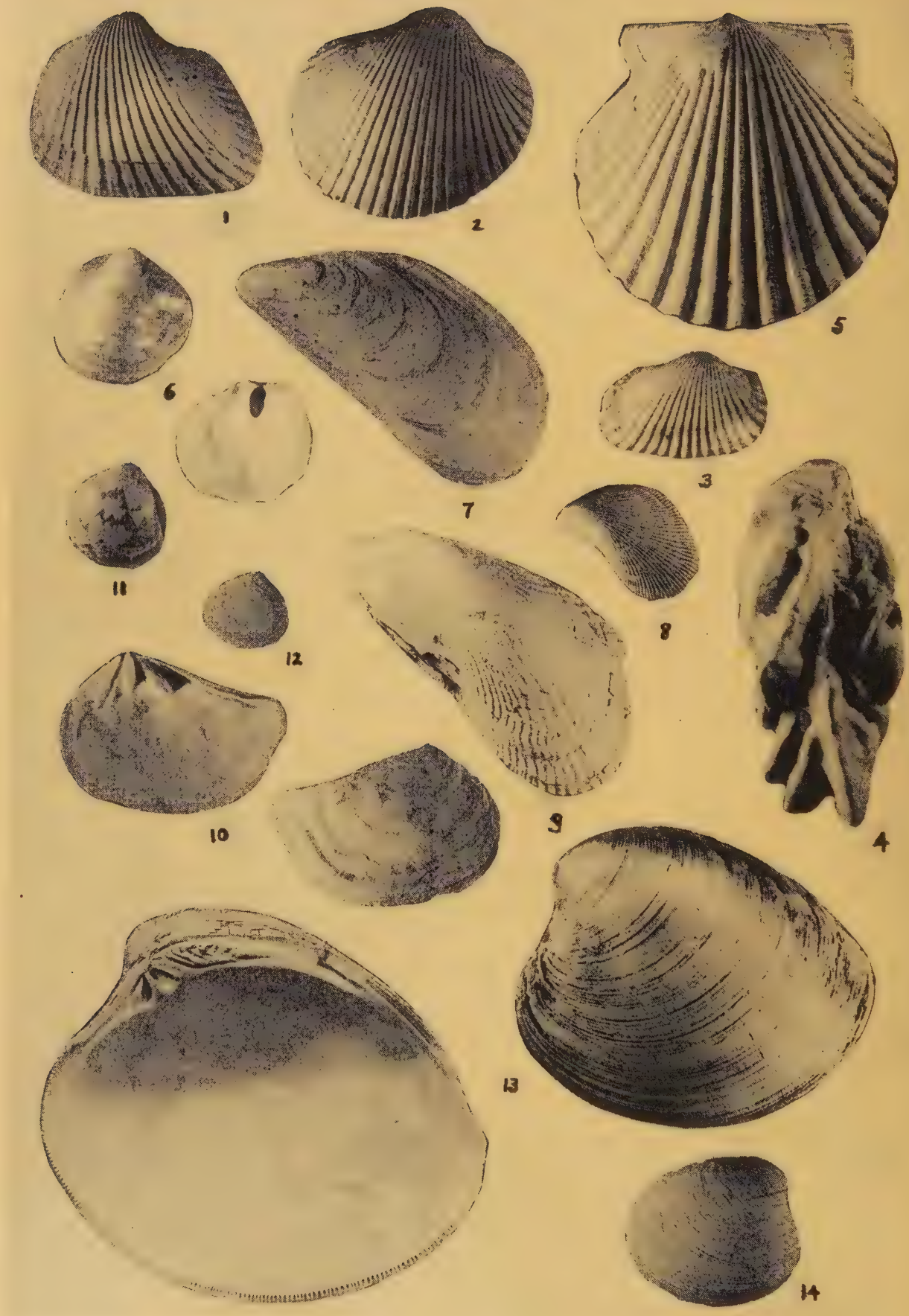


Plate No. 1

Plate No. 2

Plate No. 3

Plate No. 4

deeply-cut. Found in shallow water from Massachusetts to Texas, but particularly on Nantucket and the west coast of Florida.

FAMILY OSTREIDAE. This family of pelecypods includes the oysters, which, according to Pliny, have been cultivated by man since the first century B. C. The animals vary greatly because they modify their shape in accordance with the bottom to which they are attached.

4. Oyster. *Ostrea virginica.* This important and well-known shellfish was described in detail in the insert in *Nature Magazine* for February, 1940.

FAMILY PECTINIDAE. *Pecten* shells are the trade mark of a gasoline, and figure in art. The animals are well worth knowing in part because of their habits but also because of their economic importance. The young animals are usually attached; the adults free-swimming. The family is represented by at least 500 fossil species. The mantle hangs like a finely-fringed curtain inside each shell, with a conspicuous row of black eye dots along its base.

5. Scallop. *Pecten irradians.* This commercial shellfish was also described in detail in the February, 1940, insert.

FAMILY ANOMIIDAE. The left, or lower, shells of the members of this family are pierced. Through this hole the animal attaches itself firmly to some objects. The fixed adults have practically lost their muscle of locomotion. Upper shells are convex. Both shells let light through easily and are thin and pearly.

6. Plain Jingle Shell. *Anomia simplex.* One to two inches across. The largest of this genus on the Atlantic Coast. Oval or circular in outline but variable in shape, fitting itself to the object on which it grows. When fixed, it may bore its foot into cover. Outer surface, dark, fragile; when worn, in dead shells, shows golden or greenish mother-of-pearl. In shallow water, particularly on oyster beds, from Nova Scotia to the West Indies.

FAMILY MYTILIDAE. These mussels are the animals living commonly between the tide lines, either attached separately, grouped in nests, or sunken in burrows in wood or earth. The two shells are equal and are generally long.

7. Mussel. *Mytilus edulis.* This edible and commercial species was described in detail in the insert for February, 1940, and need not be further discussed here.

8. Hooked Mussel. *Mytilus recurvus* (*M. hamatus*). Length, 1 to 2 inches. Shell, thick; dark colored; surface, densely-striped. Rhode Island to Texas and the West Indies, being particularly abundant in Florida.

9. Humble Mussel. *Modiolus demissus plicatus.* Shell, 2 to 4 inches long; narrow, yellowish green, triangular; fat, dingy-looking, brittle, compressed behind; plaited and with finely-radiating lines or ribs; surface appearing to be varnished. Shell lining, silvery white. Attachment, long and strong. These animals make nests of shells, or in burrows. It is probably the most common of all the eastern mussels. It is found in tide waters or mud flats at the mouths of streams, usually near the highwater mark. It is often found among the reeds or where it has burrowed into banks. Because it is common and at its best in polluted waters it should not be eaten. Found from Nova Scotia to Georgia; smaller in northern part of range.

FAMILY PANDORIDAE. The shells of the members of this family are pearly, irregular, thin; usually with the right shell flat and its mate convex. Two spreading teeth in the right shell form a groove for the tooth in the left.

10. *Pandora gouldiana.* Length, 1 to 1½ inches; height, ⅔ inch; width, ⅕ inch. Delicate, clear white, rough, very thin, with iridescent interior. Found on oyster beds, in sand or mud, burrowing freely. Common to depth of 180 feet, from Prince Edward Island to North Carolina.

FAMILY CARDIIDAE. This family includes the cockle shells. The margins of the shells are conspicuously toothed. Most of the cockles are larger than the one here shown.

11. Morton's Cockle. *Laevicardium mortoni.* Length, 1 inch; width, nearly as great; height, about ⅔ the length. Shell, small, smooth and thin. Pale fawn-color sometimes with brown spots on the outside and bright yellow with a purplish blotch within. Often brilliant in muddy water, but color fades in collected shells. In shallow water (1 to 5 fathoms) on sand flats, from Nova Scotia to the Gulf of Mexico; particularly common south of Cape Cod.

FAMILY VENERIDAE. The shells of this family include some of great beauty; and others that are rather unattractive. They are among the most widely-distributed of bivalves and are found at a great variety of depths. They have long had commercial value. The foot of these shells is strong; the valves of the shell, equal and strong. The name Veneridae implies that at least some of the species must have beauty.

12. Gem Shell. *Gemma gemma.* Like small yellow peas ⅛ inch through and about ½ as wide. Pink, white, or violet-tinged, or even colorless. Surface smooth and shining. In sand, or between tide marks, or in shallow water, from Labrador to North Carolina. Abundant in many places. Young are carried a considerable time, and when freed are alive and independent.

13. Clam, Quahog. *Venus mercenaria.* This animal was discussed in detail in the insert for February, 1940, and need be no more than mentioned here.

14. Hard-shelled Clam. *Pitar morrhuana.* Shell, plump, thin but hard, chalky, with concentric scratches. Length, 2 inches. From Prince Edward Island to Cape Hatteras.

15. Cross-barred Venus. *Chione cancellata.* Length, 1 to 1½ inches. Somewhat heart-shaped to triangular but with narrow, raised ridges crossing on the surface. Dirty white to yellow brown outside, with the inside, white, violet, purple or even orange. From Cape Hatteras south to Florida and the West Indies, being the commonest Venus-like shell in Florida.

16. Spotted Callista. *Macrocallista maculata.* Length, 2½ to 3 inches. This beautiful shell has a surface marked with violet-brown patches or waves, and a shining, horny skin. Inside, it is white. The flesh is edible but rather peppery. The shell is not common but has been present from Pliocene times in Florida. It is known from Cape Hatteras to the Gulf of Mexico, the West Indies and on to Brazil.

17. Elegant Dosinia. *Dosinia elegans.* This beautiful flat shell looks like a disc. Its surface is finely but distinctly marked with concentric, raised ridges. Its length is 2½ inches. The living animals prefer the warmer waters, some distance offshore, from Cape Hatteras to Yucatan and in the West Indies. Sometimes in certain places they are abundant.

FAMILY DONACIDAE. The members of this family have wedge-shaped shells and are found in the clean sand of ocean beaches. The foot is long and the gills differ in size. The mantle is open below and fringed.

18. Wedge Shell. Pompano Shell. *Donax variabilis.* These small and beautiful shells are from ½ to 1 inch long. They are blue-white with purple or reddish bands; highly variable in color and pattern. Common on clean, sand beaches; bury themselves in the sand with surprising rapidity when necessary. In spring they are often tossed alive on the beach in great numbers and are collected and sold by the quart. Make excellent soup, and shells are used in making shell "birds", shell "flowers" and so on. Commonest East Coast wedge shell; it is found from Cape Hatteras to Texas and in the West Indies.

FAMILY SANGUINOLARIIDAE. This family includes some of the razor clams, in many of which the shells are more or less transparent.

19. Short Razor Clam. *Tagelus gibbus.* The length of this shell is up to 4 inches; the height, ⅓ the length; and the width, ¼ the length. This shell is thick and almost cylindrical. The foot is too large to be retracted into the shells and the siphons are two tubes, each of which may be longer than the shell, and each of which may have a separate hole through the sand in which the animal is embedded. The burrows have two exits because of this. Found from Cape Cod, in Massachusetts, to Florida and Texas.

FAMILY SOLENIDAE. This family includes the razor shells whose valves gape at either end and are much elongated.

20. Sword Razor Clam. *Ensis directus.* Length, about 6 inches; width, ⅛ the length. Yellowish or greenish. Right shell, with 1 projecting tooth and a long ridge-like tooth back of it; left, with 2 teeth and a double ridge. Burrows rapidly in sand at low water mark by a digging motion of the club-shaped foot. Animal much larger than the shell. Gulf of St. Lawrence to Florida.

FAMILY MACTRIDAE. These include, among others, the Beach Clams, the Channeled Ducks and others. There is a heavy, thick skin over the shell. The siphons are united and fringed at the tip. The foot is flattened and the mantle is open in front.

21. Surf Clam, Giant Clam, Solid Surf Clam. *Spisula solidissima.* Length, 7 inches; height, ⅘ the length; width, ⅖ the length. Large solid shell; brown or white. Largest Atlantic Coast bivalve. Can leap with foot for escape. May be caught by thrusting stick between open shell. Sometimes used for food, considered excellent. In shallow water, from Labrador to North Carolina. The

variety *similis* occurs from Massachusetts to Gulf of Mexico; more abundant south of Cape Hatteras.

22. Triangular Clam. *Mulinia lateralis.* A small, whitish, triangular clam ⅜ inch to an inch across and ½ inch high; width, ⅖ inch. Apparently smooth but really finely-wrinkled. Smoother to the south. Bare, white, with brownish skin. On muddy bottoms, near river mouths; abundant in many places, particularly on Long Island Sound. New Brunswick to Texas and the West Indies.

FAMILY MYACIDAE. This includes the soft-shelled clams in which one shell has a spoon-shaped tooth that fits into a corresponding opening in the other.

23. Sand Clam. Soft-shelled Clam. *Mya arenaria.* Also called "nannynose". Length, about 4 inches; width, a little more than ½ the length; open at each end. Shell, chalky white with brownish cover. Skin, wrinkled, thin and dirty brown. Common between tide lines, in shallow water and mud flats, or in sand. Burrow to depth of about 1 foot, leaving small opening at low tide through which water is spurted when clam is disturbed. From Greenland to Florida.

FAMILY PHOLADIDAE. The shells of the animals in this family gape at both ends, have tooth-like sculptures in front and have no hinge or ligament.

24. Angel's Wing Shell. *Barnea costata* (formerly *Pholas*). Length, 6 to 8 inches; width and height, each about ⅓ the length. Shell, white; animal, yellow. The shells meet only near the tips. In colonies burrowing several feet deep in sandy mud or clay, or even in wood or rocks. Massachusetts to the West Indies. Commonly sold for food in the markets of Cuba.

25. Little Piddock. *Martesia cuneiformis.* Shell small, closed and divided by a serrated canal which runs obliquely. The animals may burrow into timber or soft rock. Found from Connecticut to Trinidad.

Gastropods or Univalves

(Plates 3 and 4, pages 344 and 345)

These animals are possibly best represented by the snails. They have a single shell, commonly coiled, with an opening, the aperture, that may be closed by an operculum. A muscular "foot" may be drawn into the protection of the shell. Eyes may be present either on tentacles or at their base. The animals rasp their food with a long file-like tongue, which may be greatly extended. They may breathe by gills or by lungs, and may hear by means of special organs on the foot. They react variously to light and may locate food by the sense of smell.

FAMILY EPITONIIDAE. These so-called "staircase" shells are usually pure white and have many, rounded whorls, with conspicuous longitudinal ribs that represent periods of rest or slow growth.

1. Angular Wentletrap or Angled Staircase. *Epitonium angulatum.* This is a rather stout shell, ¾ inch long, with 6 to 11 whorls, there being 9 or 10 ribs on each whorl. The opening at the mouth of the shell is almost circular. When disturbed, the animals give off a purple fluid. They prey upon other animals and will eat raw beef hungrily. They are found from Connecticut to Texas.

FAMILY NATICIDAE. The foot in animals of this family is so enlarged by the absorption of sea water that it may cover the shell and it cannot usually be completely withdrawn into the shell. The shell is commonly rather globular, with a half-moon-shaped opening. The eggs are deposited in a collar of sand fastened together with mucus.

2. Moon Shell. Sand Collar. *Polinices duplicata.* Length, about 2 inches and width, the same. Shell, solid, with 5 or more whorls and a prominent spire. Opening, oval and oblique. A horny operculum partly closes the opening in the shell. Lip, thin and sharp. Interior, pearly or chestnut. Outside, ashy-gray to brown. Found in shallow waters from Massachusetts Bay to the Gulf of Mexico.

3. Little Moon Shell. *Natica canrena.* Shell, about 1 inch long. Brown, with longitudinal, zigzag streaks. About 5 whorls, smooth and regular, with a limy operculum. The animal lacks eyes and has a huge foot with which it envelops its food. If the prey is another shellfish, a hole is drilled in the shell and the soft parts eaten out. May eat dead fish and serve as scavenger. Often found burrowing in sand in search of bivalves. It is common from North Carolina to the West Indies.

FAMILY CREPIDULIDAE. These slipper-shaped shells have a shelf on one half on the inside.

4. Flat Slipper Shell. *Crepidula plana.* Length, 1 to 1⅔ inches. Width, just over ½ the length. Frail shell, with white, polished interior and white outside, frequently curved to conform to the shape of the object to which it is attached. The female is reported to be 15 times the size of the male. It is commonly found in all the warmer seas, often attached to shells or sea-weeds, from low-water mark to a depth of 3000 feet from Prince Edward Island to Texas.

5. Arched Slipper Shell. Quarter-decks. Boat Shell. *Crepidula fornicata.* Length, to 1 or 2 inches. Brown or white. Obliquely oval, with a white diaphragm. The animal feeds upon seaweed, or on other mollusks, and is found attached to shells of other animals. It has some commercial value as a base for oyster beds. It is common in shallow water from Prince Edward Island to Texas and the West Indies; also in Europe.

FAMILY LITTORINIDAE. These Periwinkles or Clink Shells are more or less globular or top-shaped. The shell is spiral with a round opening and a horny opening cover or operculum. A widely-distributed family in shallow water, often above tide.

6. Periwinkle. *Littorina littorea.* Length, up to 1 inch; width, ⅔ the length. Shell, solid, roughened, yellowish, black, brown or reddish with dark bands and somewhat glossy. Inside, white or brown. Shell, thick, with 6 or 7 whorls, with an acute apex. Males are smaller than females. The head projects and has conical tentacles with eyes at their bases. The foot is divided longitudinally so that when the animal moves it swings alternately from side to side. The tongue is 2 or 3 times the length of the animal. Live in shallow waters or on the rocks; feed on plant material; lay their eggs in masses on rocks and weeds. Eaten in Europe and to some extent in America; also used as fish bait. Common in European waters and was introduced on our Atlantic Coast, where it is abundant from Labrador to Delaware Bay.

FAMILY VERMETIDAE. These Worm Shells are well described by the common name.

7. Worm Shell. *Vermicularia spirata.* Length, 6 to 10 inches. The shell develops from a regular to an irregular spiral. It is yellow, brown or white and has a thin membrane-like portion with which the opening may be closed; animal retreats deep within its shell. The interior is also partitioned off by cross walls. The foot is not well developed. The head is long, with two cone-like tentacles, with eyes at their bases, and 2 other tentacles at the sides of the mouth. The animals are essentially stationary and often occur in crowded, tangled masses in shallow water, in sponges, on coral, or among weeds, or to the depth of 1000 feet. It ranges from Vineyard Sound, Massachusetts, to the West Indies and Texas.

FAMILY STROMBIDAE. Large, solid-shelled, conical-spired animals; the shells, with expanded lips deeply-notched. The opening in the shell is long and narrow, and may be closed by an operculum. The eyes are large and are at the ends of a pair of long stalks.

8. Fighting Stromb. Conch. *Strombus pugilis.* The shell is orange to brown, or purple, with a thin skin over it and which wears off quickly in old shells. Length, to 4 inches. The animals are active in attacking other animals and move by a series of jumps, moving the shell from side to side. If upset, the animal rights itself by a somersault motion. Found in shallow seas from Cape Hatteras to the Gulf of Mexico, as well as in fossil beds of the Pliocene.

FAMILY TONNIDAE. Animals with small-spired shells with large openings in which the animal is not protected by an operculum, at least in adult stages.

9. Fig Shell. *Ficus papyratia.* Shell light-brown with a darker interior. Length, to 3½ inches. The animal has a large foot and a long, narrow siphon. Found from Cape Hatteras to the Gulf of Mexico.

FAMILY MURICIDAE. This family includes the Borers (*Eupleura*) and the Rock Shells (*Murex*) from which the ancients extracted a purple dye. The foot is long and opening uniform in outline.

10. Borer. *Eupleura. Eupleura caudata.* In *Eupleura* there are 2 growth ridges to a whorl; in *Murex,* there are three. Length, ½ to 1½ inches; width, ⅗ the length. Shell, brown, gray, white or red-brown. Foot, yellow, with the remainder of the animal white. The lip of the shell is thick. There are about 7 angular whorls in mature animals. The shell is relatively common at depths of 6 to 50 feet from Massachusetts to Florida.

13. Oyster Drill. *Urosalpinx cinerea.* Length, rarely an inch.

Growth ridges, 9 to a whorl. Yellow to gray in color, but brown within. Small foot, with yellow border. Eyes, small and black. Bores neat round holes through shells of oysters and other shellfish, and then sucks out soft parts for food. Eggs laid in parchment cases each containing up to a dozen eggs and attached in rows to rocks. Single female may lay 100 such cases in a few weeks and usually places them just below low-water mark. Probably the oyster's worst enemy. Prince Edward Island to Florida; also at San Francisco.

FAMILY THAISIDAE. Short-spurred shells with no growth ridges. Many produce a crimson dye.

11. Little Rock Purple, Dog Winkle, Horse Winkle, Sting Winkle, Whelk. *Thais lapilla* (formerly *Purpura*). Length, 1 to 1¾ inches. Reddish, yellow, white, or banded. Feeds on oysters, mussels, and other mollusks, whose shells it drills until its tongue can be thrust inside to remove the soft parts. Known enemies include starfish, hermit crabs, and fish. Eggs resemble pink rice on tiny stalks attached to rock surfaces, each group containing 29 to 40 young. One individual capable of producing more than 200 such groups. Eggs laid any time of year in capsules shaped like slender eggs attached at one end and open at the other. Injures valuable shellfish. On rocks commonly in shallow water from Newfoundland to Connecticut; also common in northern Europe.

FAMILY NASSARIIDAE. These Dog Whelks have shells more or less egg-shaped, with the enamel which lines the lip smoothly spreading somewhat around the opening.

12. Lash Nassa. Basket Shell. Mud Snail. *Nassarius vibex.* (*Nassa.*) Length, ¼ inch. Chestnut and white, in bands or washes that are brilliant when the shell is fresh. Shell, with 6 whorls. The foot of the animal is forked behind. Found from Vineyard Sound, Massachusetts, to the Gulf of Mexico.

14. Worn-out-basket Shell. *Nassarius obsoletus* (formerly *Nassa*). Length, about 1 inch or less; width, ½ the length. Shell, brown or muddy. Opening, dark-brown with white bands. Body, mottled-gray. Whole animal, commonly sand-covered. Eggs, laid in spring, in sacs, on an empty clam shell or other shell; each sac, spiny, transparent and stalked. Scavengers, or may bore shells of other shellfish including their own kind. Common where water is brackish at stream mouths in shallow water, from the south of the Gulf of St. Lawrence to Florida; probably the commonest shell on north Atlantic Coast.

FAMILY BUCCINIDAE. Whelks. The shell has an unusually large opening that ends below in a wide notch or canal through which the siphon extends.

15. Waved Whelk. *Buccinum undatum.* Length, 3 to 6 inches; width, ⅔ the length. Gray outside; yellow around opening of shell, and usually white within. Several hundred eggs laid in a half-pea-shaped sac, with about 500 sacs fastened together in a mass. The newly-hatched young feed on their kind, some two months being spent in the egg sac usually during the winter months. Steal bait from fish-hooks. Form large part of diet of cod and other fish, and are used as bait by fishermen. In Europe, are fried or made into soups and eaten by man. Low water to deep water, from Labrador to New Jersey; also in Europe.

FAMILY NEPTUNEIDAE. The shells of this family are highly variable, and, except in the genus *Busycon,* generally lack color.

16. Stimpson's Colus. Short Distaff. *Colus stimpsoni.* Length, 3 to 6 inches. Generally covered with a velvety surface. Found in water from 6 to 2700 feet deep from Labrador to North Carolina, favoring the deeper water in the south.

17. Left-handed Whelk. Lightning Shell. *Busycon contrarium* (formerly *Busycon perversum*). Length, 6 to 10 inches. Fawn-colored, with bluish-brown stripes but when young, tan. The spiral turns to the left in this species. In India, such shells are considered sacred, so many are shipped from Florida to India for use in temples and in various ceremonies. The lining of the shell is shining brown. The animal is black. The eggs are in cases attached in a row to a long cord. The animals burrow in the sand for their food, which is largely other mollusks. Found from Cape Hatteras to Cuba and abundant on the west coast of Florida.

18. Channeled Whelk. *Busycon canaliculatum* (formerly *Fulgur*). Length, 6 to 9 inches. Brown, with numerous revolving lines. A channel follows the joint of the whorls. Egg sacs much as in Knobbed Whelk but with a narrow, instead of a double-ridged edge. Indians made wampum of the shells. Shells commonly used as containers, and have been used as cutting tools. In shallow water from south of Cape Cod to St. Augustine, Florida.

19. Knobbed Whelk. *Busycon carica* (formerly *Fulgur*). Length, 6 to 11 inches; width, about ½ the length; usually smaller on Long Island. Gray or brownish. Shell, red within. Lip of shell, thin. Knobs on outer whorl give the shell its name. Sexes, distinct. Food, the soft parts of oysters and other animals procured by drilling a small, round, *bevelled* hole, and sucking out the contents. Eggs laid during the warmer months, in disc-shaped sacs with double ridge around edge, fastened in a long spiral ribbon, one end of which is anchored to a stone. The egg ribbons may be a yard long. From the egg sacs emerge young whelks shaped much like the adults. On sandy beaches, near oyster beds, and elsewhere, from the south shore of Cape Cod to Cape Canaveral, Florida.

23. Crown Melongena. *Melongena corona.* Shell, pear-shaped but with curved, flattened spines, which give it a crown-like appearance, spines being arranged in two or three series. Length of shell, 3 to 5 inches. The surface is polished. The animals prey upon other mollusks, sticking their long snouts into the soft parts and rasping the muscle free. They live in brackish water where it is shallow, and are often in or covered by the mud. Florida and West Indies.

FAMILY FASCIOLARIIDAE. These Band Shells are, by some, grouped with the Spindle Shells, and this helps to describe them.

20. Giant Band Shell. *Fasciolaria gigantea.* This shell is one of the largest of the univalves as it may be 2 feet long. It is solid, has 10 whorls with strong ribs, with less distinct ones between them. There is a reddish or brown epidermis over the shell and the soft part of the animal is conspicuously red. The shell is heavy. The animals are found in shallow waters, either in tidal pools or on open shores, from North Carolina to the Gulf of Mexico.

21. Tulip Band Shell. *Fasciolaria tulipa.* The shell is somewhat like a tulip in shape and is from 4 to 8 inches long. There is a plain orange or a dark mahogany form although the color and pattern may be variable. There are 9, well-rounded whorls. There is a sculptured region near the line between the whorls which is lacking in the next species. The animal feeds upon dead animals such as mollusks and crabs, and is a scavenger. It is found from North Carolina to the Antilles.

22. Pale Tulip Shell. *Fasciolaria distans.* These shells are gray with shadowy designs in white, or may be marked with 14, dark brown bands. Length, 2½ to 3½ inches. North Carolina to Mexico.

FAMILY OLIVIDAE. These Olive Shells are brilliantly-polished and almost cylindrical. There is no operculum to close the long narrow opening.

24. Lettered Olive Shell. Panama Shell. *Oliva sayana* (formerly *Oliva litterata* Lamarck). This shell is from 1½ to 2½ inches long, usually with 2 bands of irregular markings and zigzag ornaments. It tapers at both ends. The animals live in colonies often buried in the sand. None seem to have been taken alive north of the Florida Keys. They move quickly and are covered by the mantle, which may vary in color with the environment. The mantle may completely cover the shell. The live animal may look "like a piece of fat pork".

FAMILY TEREBRIDAE. These Auger Shells are found in warm seas, and because of their shape are not easily confused with others. Some species are provided with poison glands.

25. Dislocated Terebra. *Terebra dislocata.* Length, 1 to 1⅝ inches. The animal has a long proboscis with which it squeezes, suffocates, poisons and sucks its victim to death. Movement is normally sluggish. Egg cases are found on the shells in May. Occurs from Virginia to Texas.

FAMILY CONIDAE. Little but the name "cone" is necessary to identify these shells, which are heavy and china-like. The shell-opening is long and narrow. The animals of some species can remove some of the inner whorls of their shells to make more room for themselves. Some species have poison glands and strike at their enemies or prey. Some have great value to collectors.

26. Florida Cone Shell. *Conus floridanus* Gabb. Length, 1½ to 2 inches. Yellowish white, blotched with brown, with an indistinct white band at the shoulder and at the center. Found from North Carolina to the Gulf of Mexico.

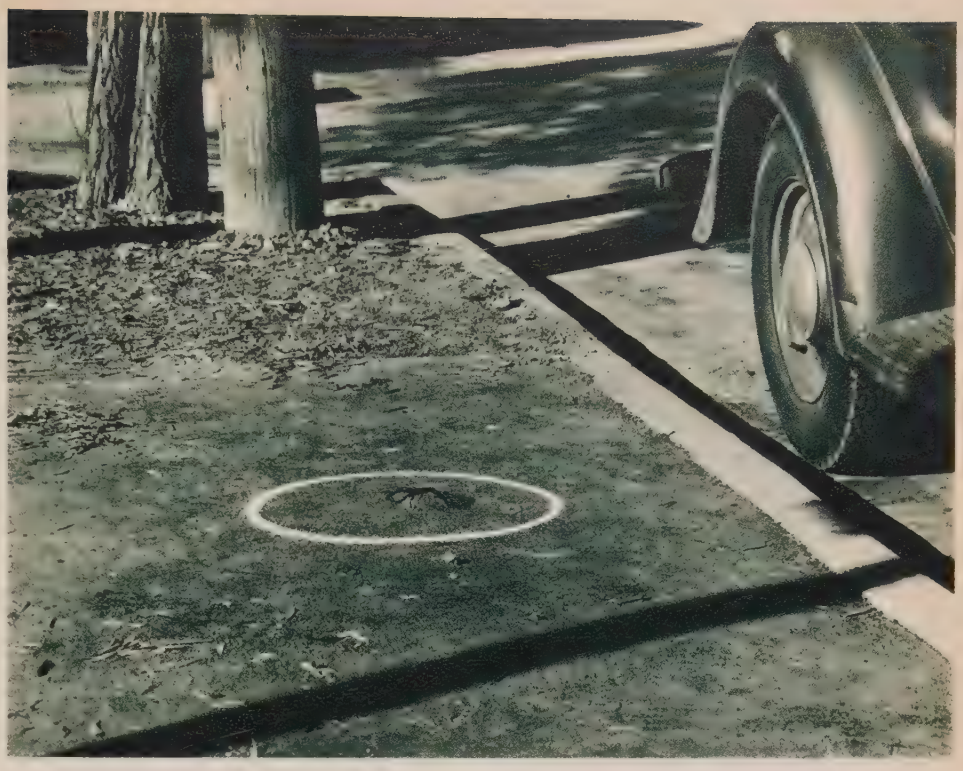
FAMILY CANCELLARIIDAE. These Cross-barred Shells are small and are marked with conspicuous cross-ribs.

27. Cross-barred or Nutmeg Shell. *Cancellaria reticulata.* Length, 1½ to 2½ inches. White, with brown bands and with the surface finely-ribbed and grooved. The animal is slow and shy. It explores with the forepart of its foot and lives on plant materials. It is found from Cape Hatteras to Guadaloupe.

A Samson of the Vegetable Kingdom

By LEON PERL

Photographs by William May



Many years ago, before propaganda and mendacious diplomatic statements so cluttered up the sheets of our newspapers, and one could enjoy a certain amount of credulity in reading news items, I read that mushrooms had been known to force a brick out of a pavement. I believed the statement.

Although, over a period of some fifty years, I have gathered mushrooms from the southern border of Canada to the Caribbean coast of Central America, not until recently did I have ample evidence that this soft growth is possessed of such a tremendous lifting power.

On October the twentieth, 1939, I watched the laying of an inch and one half thick pavement of asphalt, applied hot and smoothed to an even surface with the usual heated heavy implements. This was on Hellman Avenue near the corner of Garfield Avenue, Monterey Park, California. Passing along this strip of paved parkway early in December, I noticed a small, circular mound raised above the asphalt, evidently caused by some pressure from beneath its surface. Immediately, my memory returned to the article I had read years before. I decided that only a mushroom could cause the eruption.

Daily inspection of the little mound showed that it was gradually increasing in height and that cracks running from its base to its apex were getting wider and wider. As it was only a few inches from the concrete sidewalk, and pedestrian traffic was quite heavy, I decided to open the mound rather than run further risk of some heavy foot crushing it to pieces. Careful removal of the broken sections revealed a mushroom bud, about

Here we see the location of the mushroom mound in the asphalt. Many automobiles were parked daily beside it, but it miraculously escaped being trod upon, and the mushroom below pushed sturdily against the hard-packed surface above. It had succeeded in making a bulge in the asphalt five inches in diameter and two inches high, cracking the surface. Lest it be crushed before the evidence could be obtained photographically, the author and photographer broke away the asphalt to reveal the mushroom Samson beneath, shown on the next page.

an inch and a quarter in diameter.

When, about two weeks later, a second bulge became visible a few feet from the original one, I called Mr. May to the scene and he agreed that it would make an interesting study in photography. Every night, for five or six days, I went to bed fearful that my visit the following morning would find the little mound destroyed by the foot of some one of the many persons leaving or entering the cars that were continuously being parked opposite the spot. Knowing also that most people have a habit of kicking over any "poisonous toadstool"—the usual term given to mushrooms by the ignorant—Mr. May and I decided that, rather than risk destruction by waiting until the fungus should make its appearance, we would get photographs of the mound, now five inches in diameter and two inches high. After removing some of the fragments we would also photograph whatever might be beneath. In breaking away pieces of the asphaltum, already deeply cracked by the growth of the mushrooms, it was necessary to exert pressure of twenty-five or thirty pounds. Undoubtedly, the growing fungi had exerted several hundred pounds in their efforts to reach the surface.

When exposed they were found to be *Agaricus campestris,* or the common field mushroom. Bruising their tender skins in their tremendous push, they had turned to a tawny reddish hue. Also, due to extreme pressure, a clear fluid had gathered between the cap, or pileus, and the veil, or indusium.

Transplanting Montana Beavers

By M. M. ATWATER

Photographs by Franklin Wheeler and the Author

Every year some eight thousand Montana beavers have to be removed from locations where they are flooding roads and farms, stopping up irrigation-ditches and in other ways interfering with human pursuits. The vast wilderness area of Montana, much of it within National Forest boundaries, offers an ideal habitat where these same beavers may do good instead of harm.

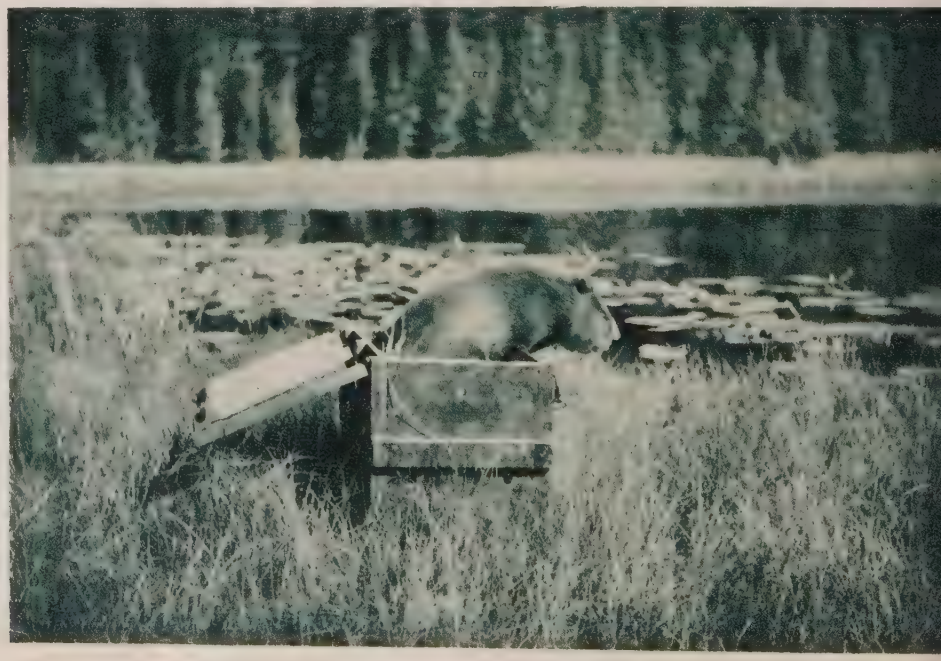
During the summer of 1939 the Montana Fish and Game Commission, in cooperation with those in charge of the Flathead National Forest, conducted a survey of the drainage of the South Fork of the Flathead River in northwestern Montana. The object of the study was to determine the beaver population and distribution on a representative wilderness area, and to investigate the possibilities and problems of a beaver transplantation program.

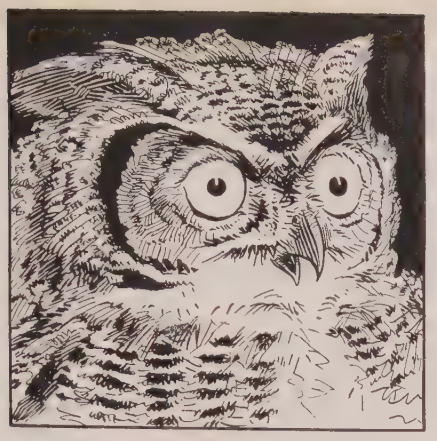
Upon the recommendations of this survey, such a program was carried out in

October, 1939, with a view to investigating costs, testing equipment and studying methods. The author, a special deputy game warden, was in charge of the project, with Raymond M. West, junior biologist, acting for the Forest Service.

The live-traps used were an improved model of the type originally designed by Vernon Bailey of the United States Biological Survey. Holding-crates and special boxes for transport by pack-animal were designed and built by the author. The beavers were taken from agricultural communities in the neighborhood of Coram, Nyack and Kalispell and were moved an average of seventy-five miles by car and twelve miles by pack-animal. They were planted at sites chosen in advance in the vicinity of the Spotted Bear Ranger station. These locations were selected both because of favorable forage conditions and for their isolation from existing beaver communities. Thus the development of the new colonies could be observed and their benefits judged.

Tabulation of the work accomplished showed an average cost, per beaver handled, of eight dollars, with death losses of ten per cent. It was shown that beavers may be easily and economically moved considerable distances. From the standpoint of a comprehensive transplantation program, however, more complete equipment would be necessary in order to extend the range of transport by pack-animal beyond one day.



As We  See It

PRECEDENT

★

Under bills filed in the 76th Congress 6450 acres of land would be withdrawn from the area of Hawaii National Park and transferred to the War Department to construct a bombing target range. This National Park, like all the others, was set aside perpetually to preserve the region, and the fauna and flora within its boundaries, in a natural state. The park is a sanctuary for a variety of native and migratory birds threatened with extinction by the constant inroads of civilization. The proposed use of this withdrawn land would be utterly destructive of these purposes; it would destroy much of the value of the park for public use, would ruin fishing along the section of the shore involved, and would alienate the area as a sanctuary.

Outside the boundaries of Hawaii National Park there are even larger areas, similar in climate, elevation and topography, that would serve the need for a bombing range just as well. These lands are worthless for agriculture. One of these areas is already under the control of the War Department.

There seems no real justification, therefore, for making this demand upon the National Park area. But most important is the precedent involved. Conservationists are faced with a continuous battle to protect national park areas from exploitation and to maintain intact the integrity and purposes of the system. Usually the demand comes from private and commercial exploiters; this time it originates with another Federal department. We see no difference. Conservationists will join with the Manuiki Audubon Society of Hawaii Island in demanding that Hawaii National Park be protected in its present form. These bills should not pass.

•

FORECAST

★

For many years there has been a perennial fight against proposals to dam and drain Yellowstone National Park waters for power and irrigation purposes. Powerful interests, both political and economic, have fostered the raids. Thus far they have been successfully turned back. We forecast another raid.

In *Reclamation Era,* official publication of the Bureau of Reclamation of the Department of the Interior—a bureau that, for some inexplicable reason, is classed as a conservation agency—we read the signs. In the December, 1939, issue is a description of the Grassy Lake Reservoir, completed by the Bureau just outside the park boundaries but draining into the park through the Falls and Bechler Rivers. We can almost hear the pleas that will be voiced in support of another storage dam inside the park to protect the investment in the Grassy Lake dam. This is a fine example of how some so-called "conservation" works.

•

A WARNING

★

At a hearing before the House Public Lands Committee in early April, Arno B. Cammerer, Director of the National Park Service, made an important statement not bearing upon the bill under discussion. He said:

"A bill will be presented to this Committee in a few weeks lifting the restrictions on hunting and mining in national monuments. It is not yet quite completed. It will appear as an amendment to the Antiquities Act."

Here is a warning that should not be overlooked by any conservationist. It is of vital concern to all of the people of the United States. It is another thrust at the policy under which our National Parks and National Monuments are operated—a policy of maintaining wildlife within their boundaries in its natural state. Hunters hate this policy; they regard the game birds and mammals within these areas with jealous eyes, and would like a chance at these rich reservoirs of wildlife. The devious method of driving an entering wedge briefly mentioned by Director Cammerer is sought because hunters and politicians would not dare take this issue cleanly to the American people. Any such trickery must be brought into the open, and its objectives defeated.

•

BILLBOARDS

★

We are constantly amazed at the growth of public sentiment against the rural billboard and the resentment among thinking citizens for what is happening to the

American landscape. This attitude is being given force because the public is beginning to realize that something can be done about it. California, a state that has been badly victimized, is tackling the problem in a progressive and realistic way. Through the wide-awake California Roadside Council citizens are being aroused in support of county zoning, now possible under state law and already applied in some counties. During Conservation Week announcers over a number of California stations broadcasted "spot" announcements that could well be used elsewhere. Some of these were:

"A tourist state which advertises its beautiful landscape, and then fails to protect it, needs a few simple lessons in the fundamentals of business." . . . "What soil conservation is to a farm community, conservation of the landscape is to a tourist state. Protecting California's roadsides from defacement is not a matter of sentiment; it is a matter of sound investment." . . . "California's roadsides are the show-windows of the state. No business man would dump his least attractive wares into his show-windows." . . . "Most tourists see our state mainly from the highways. Whether or not these tourists are pleased and want to come again depends largely upon how we protect our roadsides."

•

WATERFOWL

★

According to the United States Bureau of Biological Survey, between fifty-five and sixty million migratory waterfowl flew north to the breeding grounds in Alaska, Canada, and the northern states this spring. This is encouraging news since it indicates that the numbers of some species have started on their way back. This increase is due to restrictions on bag limits and destructive practices of hunting; to improved conditions in the breeding areas. Such numbers as are reported—or twice these numbers—however, offer no excuse for the relaxation of restrictions; for longer seasons or larger bags. With the "lid off," the one million duck hunters would make short work of this supply of migratory waterfowl. We are heartened by the assurances of Harold L. Ickes, Secretary of the Interior, to the Fifth North American Wildlife Conference that "a shortage still exists that will continue until all of the areas on the continent suitable as habitats of waterfowl are carrying capacity populations." We are sure that this conviction will enable him to stand fast in the face of demands that are certain to be made for relaxation of restrictions. These, Mr. Ickes says, cannot come until the goal he has set is reached.

•

LICENSED

★

Compilation of figures on hunting licenses, or hunting-fishing or hunting-trapping licenses, for the United States during 1938 totalled 7,524,700. For these licenses $12,627,045.28 were paid into the state fish and game departments. These figures are significant in showing the numbers enrolled in the army that finds its recreation in hunting wildlife, and in indicating the drain on our wildlife resources. The money paid for the privilege is small compared with the value of the wildlife crop harvested. And, of necessity, the bulk of this license revenue goes into salaries of personnel and for enforcement, and all too little is available for research and constructive work in behalf of wildlife restoration. We continue to hold our wildlife assets too cheaply.

•

MIGRATION

★

"There is no Migration Day, but there should be one if America's wildlife is to be preserved for future generations," declares Frances E. Clarke in an editorial in the March, 1940, *National Humane Review*. "Migration Day would publicize the statistics necessary to educate the general public in matters it knows little about. The day would be named in honor of the season when birds from near and distant southlands begin their pilgrimage toward the North. It would be observed in schools from the Atlantic to the Pacific. Forty million children would be taught the principles of conservation in programs in honor of the day, and would carry such instruction into as many million homes for the enlightenment of brothers, sisters and parents, cousins, uncles and aunts, friends and acquaintances. The day would be dedicated to the dissemination of data that would render it impossible for one-tenth of the population or thirteen million hunters (the hunting license total of the last hunting season) to control and destroy what belongs not alone to them but to all posterity."

Miss Clarke has made an interesting suggestion with valuable educational possibilities. One such day might be designated during Wildlife Restoration Week, which has become a national institution. Or it might be given lone prominence after the fashion of Arbor Day.

•

BIGHORNS

★

Bighorn sheep, perilously near extinction in the United States, are holding their own in Glacier National Park. Back in 1935 a census of the animals showed a total of 268. An epidemic of pneumonia reduced the number to 115 in 1936. Counting bighorn noses in 1939 revealed the fact that the sheep of the high places had reached 200 within Glacier Park boundaries. This small group of animals indicates how fatal it would be to allow hunting in National Parks or National Monuments, as is discussed elsewhere in these notes. Certain of our National Monuments now harbor species that are as dangerously reduced as the bighorn.

This species is one of the noblest, and one of those most worthy of perpetuation, of the large mammals of America. If the time should ever come when we cannot preserve these monuments, the inspiring wild creatures that Nature gave us, then our power to care for our own surely will have sunk to a low level!

Battling the Bugs on the Garden Front

Some campaign orders to the troops engaged in the annual war against insect pests

By ADOLPH KRUHM

Garden Editor, Nature Magazine

RIGHT off the reel we might as well agree that "bugs" will always be with us. They were busy sucking, chewing, boring, and otherwise affecting plant life on this planet long before mankind arrived on the scene. Some of the forerunners of modern insects were monsters compared with their diminutive descendents. Belgian coal measures yield fossils of cockroaches almost two feet long. And I will never forget the humorous remark made by Dr. Lee A. Strong, Chief of the Bureau of Entomology of the U. S. Department of Agriculture, at a nurserymen's meeting. He said, in effect, that men have always been more afraid of bugs than the bugs were of men.

TWO BEETLE ENEMIES OF THE GARDEN

At the right is the rose chafer beetle, and no rose grower needs to be told of its depredations. Below is that voracious and prolific immigrant that has caused such great floral damage—the Japanese beetle

He is correct, and he added that this fear of ours is largely based on ignorance. How true! If, instead of running when we see a bug, we would stop and study its habits, we might learn something. But our precious plants are in danger, and so we hustle to a store that sells drugs to fight insects and plant diseases. Actually, combatting insect life in the garden may be sifted down to comparatively few directions. It is the application of fundamental principles that counts most.

Broadly speaking, the insect enemies concerned may be divided into four classes. The most insidious of all are the sucking types, the best known of which are aphids or plant lice. Then we have the chewing insects, of which the Asiatic, black blister and Japanese beetles are perhaps the most destructive. Those that bore into the plant come next. No statistics will ever show just how much damage was done by that immigrant, the European corn borer. And if, some morning, you go into your garden to find your choicest dahlia or tomato plant cut down, just look for a sinner called cutworm.

Of the four types of insects mentioned, aphids are the most numerous. Small wonder, for a plant louse may become a grandmother within forty-eight hours. If permitted to multiply without interference one aphid will become

the progenitor of ten million offspring within a garden year. The plant lice you see on your plants in the spring are all females. They bring forth their kind without help from males, but, as cool, fall weather approaches, a change in procedure takes place. Some of the offspring are males, others are females, and all have wings. Their greater activity helps to spread the menace faster. The latest breeders produce eggs that carry the tribe through the winter.

There are hundreds of varieties of aphids of various colors and modes of living. The best known are the green aphids that begin to suck the life blood of many garden plants almost as soon as vegetation becomes active. The least understood of the sucking contingent are the scales—insects that live under defensive armor plate. The aphids and scale insects call for entirely different kinds of munitions to fight them.

The common garden variety of aphid has a soft body. It takes its nourishment through a long sharp bill which it thrusts through the outer skin of the tender herbage and gets at the juice. Obviously, no poison applied to the outside of the plant will harm it. So, in order to fight aphids we must kill the body. So we use what is called a "contact" spray. And the most effective weapon with which to fight aphids yet discovered is extract of tobacco—nicotine. A solution holding forty per cent of this—called "Black Leaf 40"—has been the chief standby for home gardeners for many years. All told, the country's growers of plants for profit or pleasure call for about fifteen million pounds of nicotine and pyrethrum preparations to fight plant lice. "Tri-ogen" is a great aid in fighting insects and diseases that prey upon our roses.

THE BLACK BLISTER BEETLE

Equipped with biting and chewing mouth parts, this fellow may be controlled by sprays

This contact spray, however, will not penetrate, and it rarely gets beneath the hard shell covering the scale insects. Here an oily substance is called for, something that will gum up and choke the pest. There are various miscible oils ready to come to the gardeners' aid, as is a so-called lime-sulphur solution. After the young hatch—the scale insects lay eggs—spraying with nicotine solutions will help to control the spreading of these garden enemies. The nation's gardeners as a whole evidently realize the need of fighting scale. Statistics reveal that forty million gallons of miscible oils are called for every year to help defend fruit trees and ornamental shrubbery against this almost invisible enemy.

The insect hordes that chew up your plants, shrubs and trees present a much simpler problem. No matter where they chew—above or below the ground—stomach poison will get them. We used to be reminded of bugs only when we saw the damage done on the flowers we love. The black blister beetle and the brown rose chafer leave plenty of proof of dirty work done while the sun shines. But there are more nefarious insects that work out of sight, day and night. The damage done by many will not show up until weeks after it is done.

The Japanese beetle is the worst offender. Like his cousin, the Asiatic beetle, he starts his work of destruction beneath the soil, preferably sod. Along in May or June you may discover brown, dead spots on your lawn. If you live in the East it is a safe bet that Japanese beetles have been at work. The grubs of this destructive pest begin to work their way out of winter quarters during March. Throughout April and early May they feed on the delicate young grass roots. At the end of May the transformation takes place, and in early June the fully-developed beetle emerges to eat its fill on foliage, fruits and flowers.

I have watched the glutton called black blister beetle, but in the flower garden it confines its destruction largely to asters and similar flowers. He is small fry compared to the Japanese beetle, for a fortune—and no small one at that—has been spent by the Federal Government in a program directed against this menace from Asia. But serious students of the situation now wonder if the game is worth the candle. To be sure the program has retarded the spread of the beetle, but his eating goes on. During the last twenty years it has spread as far west as Ohio and as far south as Georgia, and experts are not at all sure that it can definitely be stopped.

Scientists tell us that there are about four and one-half million varieties of insects in this world. Any section may have fifteen thousand species, and among them the leaf chewers call for the largest appropriation to fight them. Each year American fruit growers and gardeners require seventy-five million pounds of arsenate of lead and calcium arsenates. The use of spray materials having the non-poisonous pyrethrum as a base is constantly increasing. But to combat both the Asiatic and Japanese beetles beneath the soil will demand the use of millions of pounds of arsenate of lead for years to come. Quite a number of specific remedies are now offered especially to combat the Japanese beetle.

When it comes to the "chewers" of secondary importance—the caterpillars—gardeners find a mighty help in our friends in feathers. We feed birds all winter, but beginning in May we start to earn interest on our investment. It is then that the ugly tent caterpillars descend from nests that may have defied detection. In droves they make their way to the ground to fasten (Continued on page 369)

Sound-Placing by Birds

By W. L. McATEE

THE extent to which birds indulge in calls and songs indicates the importance of sound in their lives. Most birds seem to have great acuteness of hearing, an amazing feature of which is the accurate placing or locating of the source of a sound. While we often look in all directions but the right one to find the author of an avian note, and ascribe ventriloquial quality to it, the birds, apparently, have no such difficulty with our imitations of their calls.

Writers in a recent issue of *The Journal of Wildlife Management* describe how woodcocks in the twilight, which is the normal medium of these birds, upon hearing any of three different interpretations of their "peent", came flying, circled about, and even alighted within three feet of the human caller.

Under the conditions, that is good, but this feat in sound detection is by no means so impressive as a few that have come under the writer's observation. To judge from two of these, the birds of prey must depend in part upon sounds for finding their victims. Leaning against a post under the porch of the lodge on Plummers Island, Maryland, years ago, I had attracted a screech owl by "squeaking". The bird at first came to a tree, perhaps twenty or thirty feet away. Not to alarm it, I remained as motionless as possible, but made one more very subdued squeak. Instantly the owl dived from its perch and came disconcertingly close to the source of the sound, as in turning, after realizing that something was wrong, its wings brushed my cap and face.

Only a year or two back at another rustic cabin, in Lost River State Park, West Virginia, I had a somewhat similar experience. Sitting on the porch, I was again "squeaking" to induce some migrant warblers within easy observing range, when my attention was attracted by a muffled crashing in the brush some fifty yards away. A hawk burst forth across the intervening road and open yard, giving me opportunity to recognize it as Cooper's redoubtable bushwhacker. At first I did not sense that it was coming to my squeak, but that soon became unmistakable as it came on and on right for my face. A few feet away it sheered off, leaving me thankful that the bird had vision to match its hearing—excellence of sight sufficient to perceive the fraud in a sound that seemed to indicate the makings of a meal. It would have been no fun had that Cooper's hawk kept on coming with eager talons, with my face as the target.

On a walking trip near Great Falls, Virginia, some years ago, I heard a bob-white giving what we term its rallying call. At once I stopped and answered this easily imitated sound. Response was immediate and challenging; the bird came running, as the patter of its feet in the leaves plainly told. To avoid suspicion of my imperfect calling, I gave it lower and lower as the bird approached, finally becoming as silent and as rigid as I could. Nevertheless, the bob-white ran clear up to me and tapped its bill on the toe of my boot. It had accurately located a source of sound, and came straight to it.

Perhaps the most remarkable instance, as well as a very charming bit of experience with a bird, happened to E. A. Preble and me on one of the numerous bird trips we made together in our prime. Somewhere between Mount Vernon and Dogue Creek, Virginia, Preble was "squeaking" in an effort to bring to sight some additional bird for our list. This sound is made by sucking against a finger or the palm, and as Preble was in the act, a tufted titmouse flew down, alighted on his hand and pecked at the offending finger right under his nose. Preble told me that this was not the first time a bird of this species had bitten him, for years before, in the Alleghanies, while he was attracting small birds for easy identification, a tufted titmouse had seized his finger. This bird was really in earnest, for she hung on by her bill for upwards of half a minute, and left the prints of her mandibles in the soft flesh.

These instances show well the ability of this bird to locate sounds, and impressed upon us anew how superior in some ways are the capacities of the so-called lower animals, but which I prefer to call, and I wish it might be with their approval, our little brethren of the wild.

LIFE WITH RUBY

Glimpses of a hummingbird family

By HELEN SAUNDERS WOODELTON

We live in an old-fashioned "brownstone front" in the heart of the city, but we love the outdoors. Since we are both teachers it seems best for us to live amongst brick and mortar, near our work, but for vacations we seek places remote from other people and as close to Nature as possible. So we had come, this first day of July, to an island in the St. Lawrence. We knew a place of beauty and solitude that was, this time, near the summer home of relatives. Here we could have independence, and the fun of camping. Roy could play golf with Uncle Tom, I could visit, and, perhaps, be lucky enough to find opportunity for bird photography with my new motion picture camera.

We fully considered the possibilities of every open level spot, finally finding just the place, small but large enough, with level spots, for the tent, the table, and campfire. It was sheltered from the wind by a knoll, partly shaded, partly open, with a good view down to the sparkling St. Lawrence. A curtain of trees screened us from passing motor boats, and our tiny green tent and tarpaulin shelter were almost invisible. This was no hasty, overnight stop, so a fireplace was constructed, wood gathered, shelf put up for provisions, and nails set for hanging pots.

Next day, dinner over, we sat at our camp table content to relax and dream, and to absorb the beauties of fleecy white clouds moving in a blue sky; of dark green pine branches silhouetted against rippling blue water; of soft cool breezes on our sun-warmed faces.

But what was that? Could it be a hummingbird here in the pine woods? There were no flowers here to attract it!

UP THE LADDER TO THE BLIND
The author spent many hours aloft, with much time for meditation between the bird's visits to the nest

Roused from our reveries, we were alert. Back it came, this time darting about our heads, and then settling on a knot up on the pine bough. But was it a knot—that tiny lump? No, the bird was sitting on a nest! A hummingbird nesting right in our camp and just over our heads!

Plans for golf were forgotten. Instead we debated how to photograph the mother and still unhatched offspring; how to get near enough to such a nest. It was fifteen feet up to the slender pine branch, and much too far from any tree trunk that might provide support for a blind.

Days of varying activities and much suspense followed. It seemed as though our camp doings must surely frighten the mother away. The smoke of our fire enveloped the nest. While we ate we watched. Sometimes we missed our bird; feared she had left. Then she would return, to our relief, and sit for a few minutes on those precious eggs. Yet she never seemed to stay but a few minutes, and was away for long periods.

One day, just a week after we found the nest, we saw the mother standing on the edge, feeding her invisible babies. We must have a blind. Four long poles were braced together with boards from a fallen barn, and guyed with strong wire to the nearest trees. A ladder and a platform atop the structure made a sturdy though rough-looking tower, all constructed with a camp axe and a few nails. But would the mother tolerate this enormous tower so close to the nest? Fearlessly she came back to feed the family, and never seemed to notice it.

The next day I carried up the ladder the blankets, old burlap, safety pins and string for the blind, a campstool and all my camera paraphernalia. All that long afternoon I sat in a cramped position, with my view of the outside world limited to a slit for the movie camera and another opening through which the still camera extended. Roy had gone to play golf, and no living soul approached until he returned, four hours later. Only the songs of birds, the scolding of a saucy red squirrel, and the chug-chug of a passing motor boat broke the stillness of that summer afternoon.

After preparing to photograph, I hung some glass hummingbird feeders all over the pine bough, hoping that the syrup would keep the lady nearer home. She arrived with a sudden whirr of wings. Chattering excitedly, she skyrocketed up to the nest, sensed something was wrong, flew all around the blind, scolded vigorously, darted away, came back, and finally alighted and fed the young. Apparently she never noticed the feeders, for not once did she investigate them—then or later. She knew that pine trees have no flowers! A wise bird was she.

There followed what seemed like endless waiting, for only twice did the mother return, an hour between visits. I had time for meditation such as I'd rarely had before. It was out of the question to read or write. I must be alert for the sounds that told of the bird's approach, ready to pull the string of the still camera, or to shoot what I could with the movie. No more than one still picture could be taken on each visit, or ten feet of movie. And what concentration it all required! In fact, I was quite exhausted at the end of that first vigil.

THE CAMP IN THE WOODS
Here rest and quiet and beauty were found, not to mention an exciting bird family as subjects for the new camera

To one who has never seen a hummingbird feed her young the sight is appalling. That javelin-like bill thrust way down inside each tiny bird, almost to its toes, makes one wonder why on earth they are not riddled with bleeding wounds. Hummingbirds feed by regurgitation, and it seems to take quite an effort to bring up from the depths the insects and concentrated nectar.

A drab little mother is Madame Ruby-throat, with her dirty white breast, dark-gray wings and tail, relieved only by a shining iridescence when the sun shines on her green back. And what ugly little birds she attends! They seem to be covered with spines, so sharp are their feathers. They have no down like other birds; nothing soft about them! As for their gorgeous father with his crimson breast, he must not even know of their existence. Not once did he visit the nest and offer me a chance to photograph that shining throat! Whether mother met him we knew not.

One day I decided to try slow-motion photography. I feared that the increased noise of the motor would scare the mother but she merely stopped for a minute to gaze intently at the camera lens, and then went right on with the business of feeding. Once I was not ready so I stuck out my hand and waved it around to keep her away. This worked; she retreated just long enough, and came right back. After that I used the same method when I needed to change a film, or wanted to photograph her on the wing.

When it rained I climbed up to see how she met the situation. I expected she would come to shelter her children from the heavy drops, but she left them exposed, crouching down in their wet nest. She came and fed them as usual, quite unperturbed by the weather.

The little fellows' heads popped up at the sound of their mother's approach; they stretched their scrawny necks and eagerly reached with gaping mouths for the food she brought. At her departure they sank again to slumber on the gently-rocking bough.

I had been impressed by the way the sparrow cleans her nest, watching for the sack of excrement and instantly removing it; the robin, eating it instead; the goldfinch, quite oblivious while her babies fouled their nest. Most efficient were the baby hummers. They lifted their tiny rear ends high over the side of the downy nest, and squirted quite far and clear of the edge!

As the little birds grew larger their mother fed them frequently. At three weeks it was every twenty minutes. By that time the soft nest was so well worn that she could no longer stand on the broken left rim. The youngsters lifted their long necks so high that she had to perch at the right on the up-sloping branch in order to reach them. Sometimes she fed from the air while in flight, but usually she stood, using her tail and wings for balance during that strenuous process.

On our last day on the island the birds were three weeks old. When would they be ready to fly? We could not wait for the answer, but that last day I worked in the blind until sundown.

We left the tower standing and commissioned John, who cares for the golf course, to saw the branch off when the birds had flown. When we came back to take the structure down and clear away the wood, John told us he had made four visits before he could use his saw. The second baby had remained for two weeks after our departure. Scarcely half of the tiny nest was left. The green patches of lichen were falling off, and the down was coming apart. It had been lived in for more than six weeks. Battered and broken as it was we packed it tenderly and brought it home to remind us of our first intimate glimpses into the family life of that tiny sprite, the ruby-throated hummingbird.

•

The Hermit Thrush

By DOROTHY J. GRISWOLD

I heard him in the northern woods at dusk,
A voice that clove the silence like a bell;
Then earth became a charmed, enchanted place,
And land and sky were hushed beneath the spell.

A modest birdling in the templed glen,
His life a hermit's, so remote and shy;
Boasting no cheerful or confiding ways,
Or flash of color to make glad the eye.

A recluse even from the feathered throng—
An obscure shadow in the world of day.
The casual never know his forest home,
Or hear the witchery of his matchless lay.

But when the dark'ning forest's regal crests
Are etched against the amber tinted west,
And silvered stars proclaim the twilight hour,
And tenants of the woods have sought their rest;

Then, wise musician, when the stage is set,
And winds are hushed within his sylvan bower,
When earth lies silent, he brings forth his song,
And Heaven's door ope's in that magic hour.

The resonance of bells chime in his song—
The crystal tinkle of the mountain stream,
An eerie quality of unknown heights
Is woven in the tenor of his theme.

Long since I heard thy nocturne in the dusk,
O Hermit Thrush, within thy woodland shrine,
But years serve only to enhance thy charm,
And bless the memory of that song divine.

"Stars" and Oysters

By LEWIS RADCLIFFE

WRITINGS on the philosophy of biology stress such subjects as the struggle for existence, natural selection, protective resemblance, warning characters, mimicry—factors which contribute to the ability of a plant or animal to live and multiply. Less emphasis has been placed on the ways in which the enemies of a given species have developed characters threatening its existence. Oysters are our most important shellfish; in fact they are the basis for our second most important fishing industry. Anyone who has tried to open an oyster by thrusting the point of a knife between its shells has probably concluded that its natural enemies must have jaws capable of tearing the oysters from bed rock and crushing the shells. Yet the common, defenseless starfish, *Asterias forbesi,* is the oyster's Public Enemy Number One. For example, in the state of Connecticut alone it is estimated that "stars" destroy 500,000 bushels of oysters annually, and between $100,000 and $150,000 are expended each year by the oyster farmers in mopping up these pests. Combined, these represent losses of more than $500,000 a year in one state.

STARFISH ATTACHED TO A CLUSTER OF OYSTERS

There are two schools of thought on how the stars get to the oyster within the shell, one holding that it is by continued pull, the other that the stars produce a fluid weakening the oyster's adductor muscles

One may wonder how a defenseless animal like the starfish, with a mouth about one-fourth inch in diameter, can devour large quantities of oysters and other mollusks. Yet these are the principal foods of starfish, which gather where there are large numbers of mollusks, and are rare on bottoms devoid of shellfish.

While there are some differences of opinion as to the way in which the starfish is able to gain access to the fleshy body of the oyster, the generally accepted explanation is that the starfish wraps itself around the shell in such a manner that its arms are attached to it by the numerous sucker-like tube feet. With these suction tipped feet it exerts a pull on the shell. While the oyster can resist a strong pull for a short time, the adductor muscle, which holds the two shells together, eventually becomes fatigued by the continuously steady pulling and the mollusk finally gives up and opens wide. Then the starfish everts its stomach through its mouth opening, digesting the soft tissues of its victim. When one considers the large number of tube feet of the star, each having an adhesive force of about twenty-nine grams, it will be appreciated that the pull exerted is considerable.

On the other hand, experiments have shown that an extract from the starfish stomach exerts a toxic effect on the heart of the scallop, and produces abnormal shell movements in oysters. These and other experiments have led to the belief that the starfish is able to secrete some substance capable of paralyzing the adductor muscle of its victim.

Whichever the method, the speed with which starfish devour clams, oysters and other shellfish is surprising. In one experiment a single small starfish devoured more than fifty clams in six days. In another, a medium-sized starfish destroyed several one-year-old oysters per day. In another, two starfish, feeding continuously, destroyed twenty-five one-year-old oysters in three and one-half days. In still another, a small starfish destroyed twenty-five young oysters in three days. A one-year experiment at the Beaufort, North Carolina, laboratory of the Bureau of Fisheries, checked up on the appetites of ten starfish. During the first six months these ten ate more than 1750 oysters ranging in age from one to three years. They were hungriest during March, least hungry during June. Although adult healthy oysters are, of course, much more resistant to such attacks, it is evident that a plentiful supply of stars constitute a major threat to stocks of mollusks.

Nature has fortified the starfish in other ways as a destroyer of oysters. In addition to being prolific breeders, the starfish spawns sufficiently in advance of the spawning period of the oysters so that by the time the first young oysters of the season are ready to attach themselves to shells (or to set), the young stars have reached such size that they are ready to attack the oysters when they are most susceptible to attack. In this way, if the set of young oysters

A STARFISH MOP
These are dragged along the bottom, the stars adhering to them and being thus brought aboard the boat

is small or moderate and stars are abundant, the year's set may be almost wholly destroyed by the young stars. On the other hand with only a small or modest spawning stock of stars, a rich set of oysters coupled with favorable conditions for the stars may result in a surprisingly high survival of the young and thus become a factor more important in creating a large crop of stars than the fecundity of the adult or the intensity of their setting in that season.

Such an occurrence actually happened in Long Island Sound waters in 1939. While the stocks of adult stars were small and their setting was considerably lighter than in preceding years, rapid growth and low mortality, attributed to an abundant food supply—rich sets of oysters and jingle shells—resulted in such a large addition of young vigorous stars as to threaten the destruction of the oyster industry in that area. Such combinations of factors are now recognized as the principal cause for rich year classes of forms of life in the seas and probably in our fresh waters as well.

If you have ever examined a starfish you may have cause for wonder as to the methods employed by the oyster farmer to rid his oyster beds of these pests. He can, of course, dredge up the surface layer of oysters and stars, picking out the latter and shoveling the oysters back on the grounds. However, the most practicable method yet devised is to use a "starmop." This consists of an iron bar about ten feet long to which are attached a series of twelve to sixteen large mops or brushes of heavy rope-yarn, each about five feet long. As the mop is dragged over the bottom, the stars cling to or become entangled in the brushes. The mop is hoisted aboard and dipped into vats of hot water, which kills the stars. Two mops are usually in operation, one on each side of the boat. More recently oyster farmers have been spreading quicklime over the heavily-infested bottoms. The caustic action of the lime coming in contact with the stars creates lesions that usually penetrate through the body wall and result in the death of the stars without having serious effect on the oysters.

As to the abundance of starfish, a Narragansett Bay, Rhode Island, oyster company operating one steamer for the sole purpose of destroying starfish on its beds, averaged 425,000 pounds per year during the decade beginning with 1924. In February, 1938, two starfish boats operating in the area near York Spit Light, Chesapeake Bay, handled from 400 to 500 bushels of starfish per boat per day. While these are above average catches, they serve to illustrate the threat of stars to the future of the oyster industry, especially in those years in which there is an invasion of these pests, such as now obtains in Long Island Sound.

•

Life of a Walking Stick

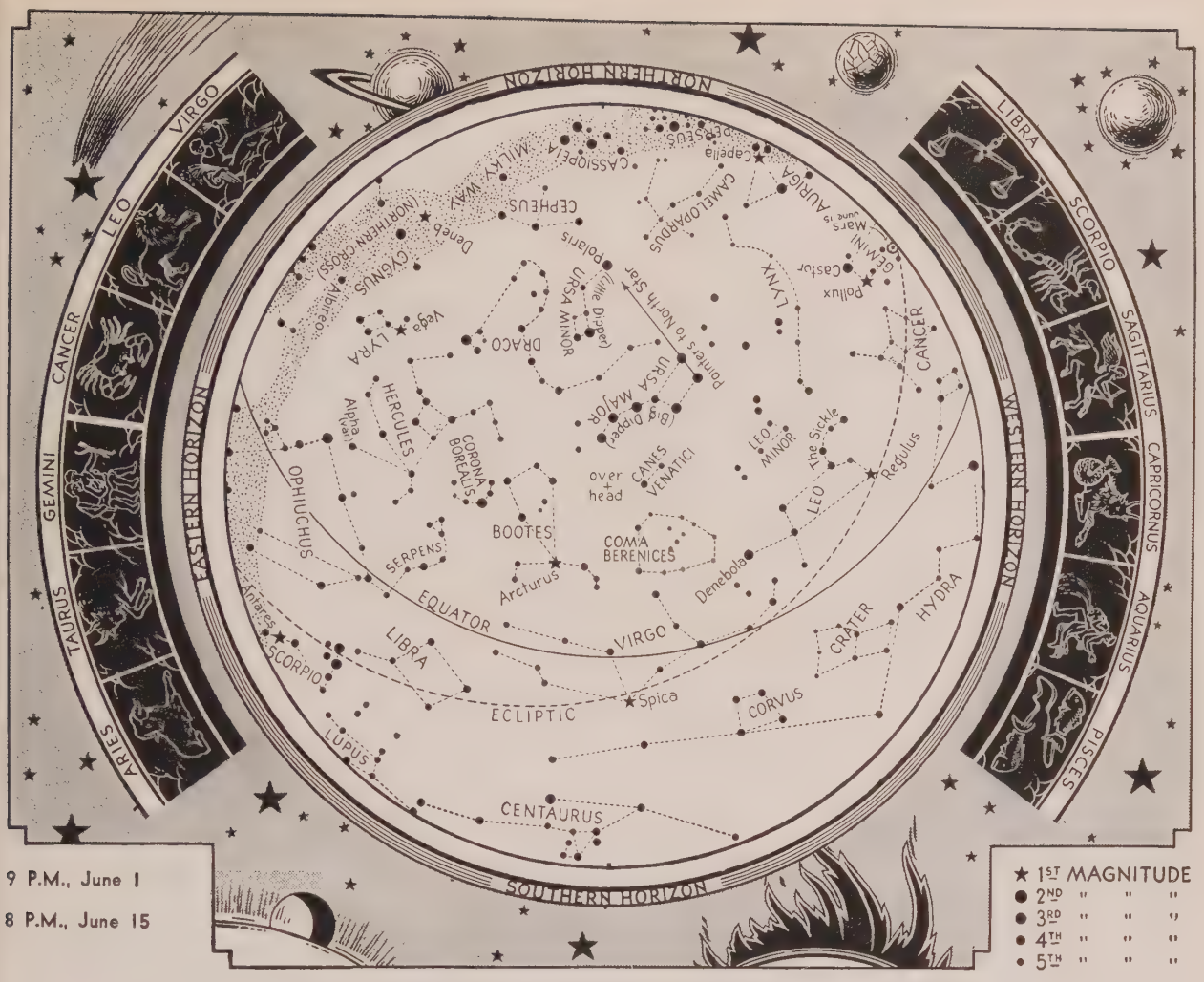
By ROSAMOND TRYON

I was born when it was spring
Just a tiny twig-like thing,
An insect but without a wing.
Poor thing!

Then as summer days drew nigh
Among the green twigs I would lie
So like them that the human eye
Passed by.

But when autumn colors came
With leaves as bright as bonfire flame
The twigs turned gray, I did the same.
A shame!

And then my eggs I laid at last
And put them in the withered grass
I left them there and died.
Alas!



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

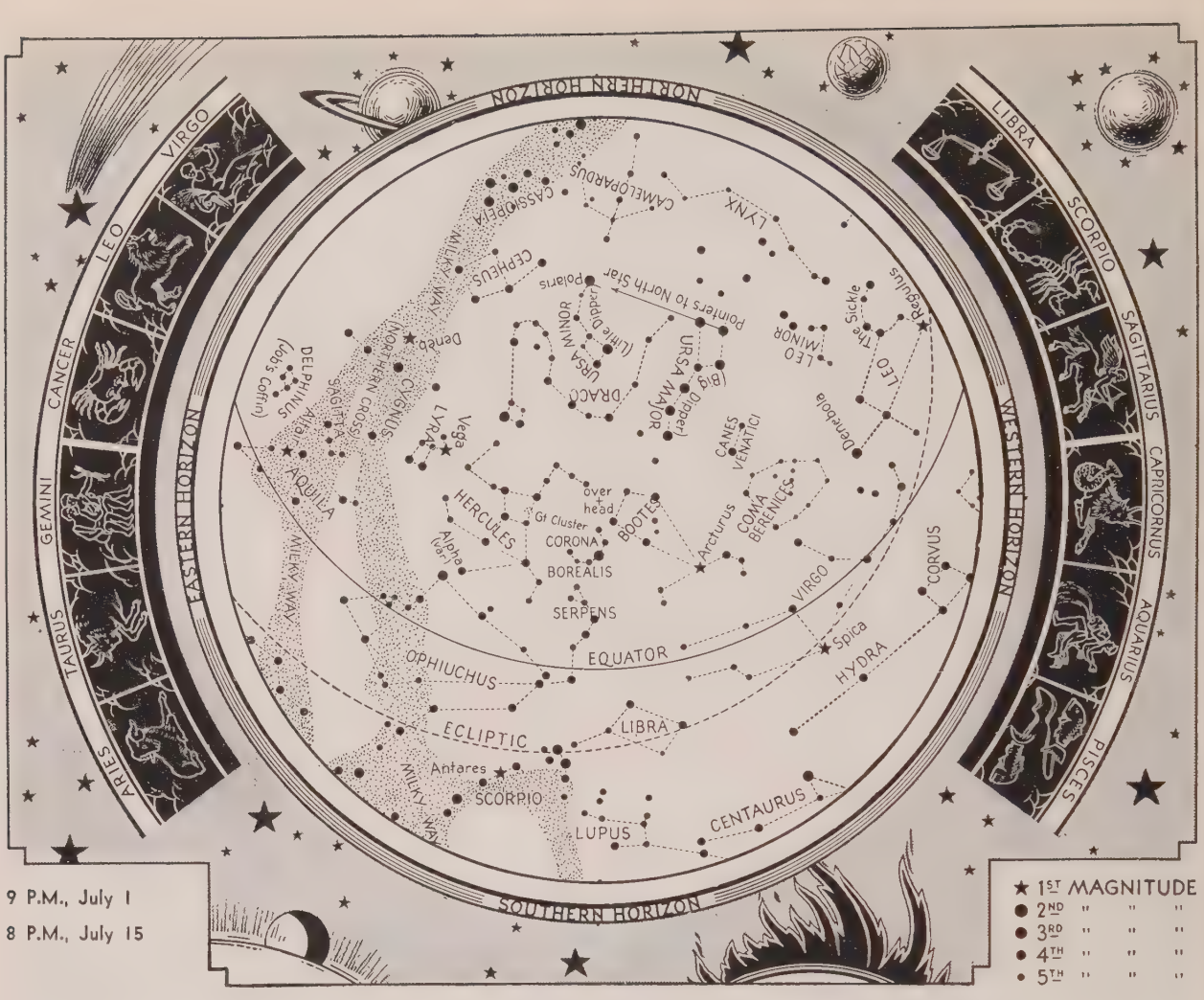
The Evening Sky in June and July

By ISABEL M. LEWIS

IN THE early summer the constellation of Hydra, The Water-snake, stretches across the southern sky from the southeastern to the southwestern horizon. Directly above it are its Riders, the two small constellations of Crater, The Cup, and Corvus, The Crow. The length and total area of Hydra exceed those of any other constellation in the heavens, although, with the single exception of the star Alpha Hydrae, or Alphard, which is of second magnitude, it contains no bright stars. Its length is enormous, for it extends in a long line of faint stars from a point south of Cancer, where a small group of stars outlines its head, to a point a few degrees southwest of Libra. The three zodiacal constellations of Cancer, Leo, and Virgo lie above it, in addition to the two Riders. These constellations fill the entire southern heavens at this time of year.

The first magnitude stars, Regulus, in Leo; Arcturus, in Bootes; Vega, in Lyra, and Spica, in Virgo, are the most conspicuous stars in the evening sky at this time. The reddish-orange color of Arcturus is in marked contrast to the diamond-like splendor of Vega. Both of these stars will remain in view in the evening sky throughout the summer and far into the fall, Vega being the last to disappear. The beautiful white Spica, in Virgo, although apparently inferior to Arcturus and Vega, actually far surpasses them in intrinsic brightness. It is one of the super-giant stars, at a distance of about 180 light years from the earth, while Vega is at a distance of only 23 light years, and Arcturus 32 light years. Altair, in Aquila, also one of the brightest of the summer stars, lies to the southeast of Vega and is the last of these stars to rise. It is white in color and is a close stellar neighbor of ours at a distance of only 18 light years.

The five planets that were so spectacularly grouped together in the western evening sky in late February and early March are now widely scattered. Jupiter and Saturn are visible before sunrise; Venus is rapidly approaching the sun in the evening sky; Mars is fading into the evening twilight; Mercury is coming into favorable position for



observation at eastern elongation in June, but disappears as inferior conjunction approaches in July.

There will be a close conjunction between Venus and Mars on June 7, which will be best seen on the evening of June 6. On June 26 Venus will be in inferior conjunction with the sun and will then pass to the morning sky, where it will remain until the end of the year. On June 11 Mercury and Venus will be in conjunction, but low in the west. Mercury will be seen with difficulty, unless one has the aid of binoculars, as it will be unfavorably located at that time. Its position improves daily, however, as it approaches eastern elongation on June 24, and it should be visible in the evening twilight until the end of the month. It is also in conjunction with Mars on June 16, when Mercury will be less than half a degree north of Mars. Venus will be a brilliant object in the morning sky by the middle of July, when it will rise more than an hour before the sun. At the end of July it is approaching its greatest brilliancy.

There will be an occultation of Venus by the moon on July 31. This will be visible in the central and western part of the United States. It will occur in daylight after four o'clock in the central states and about two hours earlier on the Pacific Coast. An occultation of Saturn will occur on June 30. This is also a daylight phenomenon taking place on the Pacific Coast near noon and therefore invisible, except possibly telescopically. Venus, however, is visible to the naked eye even in broad daylight, and it should be possible to see this interesting phenomenon if one lives in the part of the country where it occurs. Although there are many occultations of stars by the moon every year, an occultation of a bright planet by the moon is a comparatively rare occurrence.

During July, Mars will be too near the sun to be well observed in the evening sky, and Mercury will be invisible except possibly for a few days early in the month. It will be in inferior conjunction with the sun on July 22.

Jupiter is now rapidly increasing its distance from the sun in the morning sky. It rises more than two hours before the sun, early in June, and by the end of July shortly after midnight. Saturn is only a few degrees east of Jupiter in June, and this distance decreases steadily during the two months, until, by the end of July, they are less than two degrees apart. Jupiter is, next to Venus, the most brilliant stellar object in the heavens and in color is a golden yellow. Saturn is a pale yellow and resembles a star of the first magnitude. On July 28 the two planets and the moon will form an interesting group in the morning sky, Saturn being very close to the moon and Jupiter not far distant.

On June 21 at 8:37 A.M., Eastern Time, the sun will reach its greatest northern declination and summer will begin. This is the longest day of the year in the northern hemisphere. On July 4 the earth is at that point in its orbit

farthest from the sun, known as "aphelion". The time at which it reaches this point does not vary more than a day or so from year to year, occurring always early in July. The earth's distance from the sun at that time will be about 94,239,000 miles. At perihelion, which occurred on January 2, its distance from the sun was 91,343,000 miles. One might expect, since the earth is nearer the sun in the winter of the northern hemisphere and farthest from the sun in our summer, and vice versa in the southern hemisphere, that the seasons in the northern hemisphere would be less extreme than in the southern hemisphere, but this does not seem to be the case. It has been suggested that the much greater water surface in the southern hemisphere tends to ameliorate the extremes of temperature.

•

The South American Lung Fish

By ARTHUR H. FISHER

AMONG the many paradoxes to be found in the great Amazon Basin of Brazil is the South American lung fish, which shares honors with an African cousin in being able to live without water for protracted periods. Thus, as to habits, it forms a connecting link between the amphibians and the fishes.

The lung fishes first made their appearance in the fourth period of the Paleozoic Era, and by the time of the Lower Carboniferous Age they had become a numerous group. From that time, however, their numbers steadily declined, until today only three genera survive; one each in South America, Africa, Australia.

Young lung fish, like embryo sharks and the salamanders, have external gills, which all but disappear at maturity. The small, covered gills that remain are then insufficient to supply their respiratory needs, and so, like frogs, they must at intervals rise to the surface for air. However, with the coming of the dry season, and the absence of water in the swamps they inhabit, the South American species is fully prepared. Burrowing into the mud, with a porous lid at the surface of their gallery, they cover themselves with a mucous secretion, the gill openings are closed for a long period of aestivation, and they breathe through the mouth. The cellular air-bladder then functions as a lung, and they breathe as continuously and as rhythmically as a mammal.

With the return of the rainy season, the creature pushes open the lid of the burrow, and *Lepidosiren paradoxa* gracefully swims forth to play once again the rôle of a fish. The gills resume their work, and the lung again becomes an air-bladder.

With the African species this phenomenon is slightly varied during the dry season, the fishes encasing themselves in cocoons of mud with small openings left to admit air. In this state they have been successfully transported to many distant parts of the world. Upon arrival, the cocoon is placed in tepid water, and an active lung fish emerges in a short time.

Apparently, in the case of the Australian species, this odd period of aestivation does not occur. Better gills have been retained and the creatures live continuously in water, although they must frequently rise to the surface for air.

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

The Shell Game—It's Fun

Of all kinds of "insane" persons, those who collect shells, and continue to collect more shells, are probably the most harmless. The writer has a mild case of this "insanity" and may not be able to judge the victims in true perspective, but at least he can view the case from within. He therefore feels qualified to say that the shell-collecting game is a disease that is generally enjoyed by those who have it—at least in the milder forms. There are possibly some of the wilder forms that may not be so pleasant. In any event, the disease is highly contagious.

The writer has collected shells from the tops of trees in the mountains of Hawaii and Jamaica to considerable depths in the sea. The equipment has varied from little cans tied to the tips of jointed fishpoles—to save the climbing of trees—to heavy metal dredges dragged behind power boats at the end of strong metal cables. He has not engaged in the refined techniques employed by the real shell cranks, and it is therefore the purpose of this article to tell of some of the simpler tricks of the trade concerned with the collecting, cleaning and exhibiting of shells. The techniques are further limited to the collection and exhibition of shells of the sea, leaving out of consideration those of fresh water, and, more regretfully, those beautiful shells borne by the land snails of the trees of the tropics. As in all such cases, the writer's techniques have been developed largely, although not entirely, through imitation of others to whom, of course, acknowledgment is due and is willingly given.

Almost any accessible place reached by sea water may yield shells of some sort. The exposed rocks yield periwinkles, mussels and chitons. The tidal pools support fig shells, scallops, cockles, glistening clams or wedge shells. The mud flats produce clams, angelwings; the sand flats, clams, scallops and others.

The conspicuous shells are not always the best. In fact, one is most likely to find a new species for a locality by seeking those that are inconspicuous. A turned-over piece of driftwood, a mass of seaweed, a pile of broken shells and trash, may produce the best of finds. Even dead fish may yield shells from their stomachs, shells that the fish collected as food from inaccessible deeper waters.

Experienced shellers watch for times when the tide is right. An offshore wind following a prolonged storm and accompanied by an abnormally low tide should yield finds that justify early and inconvenient rising. The tides may be known in advance by consulting an almanac or watching the daily papers.

Shore shellers may carry a variety of equipment. Among these tools might be baskets or bags to carry the collected shells; sieves or nets to sift sand and mud from shells; forceps and a knife or screwdriver to pick or pry shells from rocks; possibly a stoneworker's hammer to dig them from pits in rocks; a trowel or spade to dig some species from sand or mud. If collecting is to be done in shallow water, particularly over coral, a floating, glass-bottomed box, through which the sea bottom may be seen more clearly, is valuable. Hand lenses and jars of formalin or alcohol may be a part of the equipment, and a supply of small cheesecloth bags and various kinds of paper for wrapping will be handy. There should also be a notebook for recording findings, possibly a camera for photographing the exact spot where a particularly valuable shell was found, a thermometer for recording water temperatures if collections are made in the water, and so on.

It is best, normally, to make a superficial survey of the beach to collect the conspicuous forms brought in, and then to comb it more carefully for other forms.

Shells collected in any relatively limited area should be kept together. A number on a cloth bag containing such a collection, together with a record inside, may identify these shells. If no more than four areas are to be hunted over, it may be convenient to wrap all the shells from one area individually in "funny" papers; of another, in rotogravure papers, and of the third in ordinary printed sheets. Tabloid newspapers and plain wrapping paper may be used as fourth and fifth easily recognizable types of wrappings. These may be easily separated later. Particular effort should be made to make note of activities of living animals found. There are few of the approximately 60,000 known shellfish on which we have any extensive life habit data.

When the conspicuous shells of an area have been collected, it is well to shovel into the container a number of cupfuls of sand and "junk" to be examined more leisurely later with a microscope. This may yield the best finds of the trip.

If one is staying in a region for any considerable time, certain shellfish may be "baited" to an area with food such as dead fish, shrimps or other animal wastes. Those collecting live animals should use care not to collect exhaustively, with the result that the source of supply may be destroyed. No such limitations need be considered by those who collect dead shells. In fact, generous collections should be made of dead shells because what is common on one day may be rare possibly for a number of years afterwards. These abundant collections should include representative color variations, if any, young and mature animals, abnormal individuals, and so on.

While the hard shells of shellfish may not deteriorate rapidly or be unpleasant, one can not be similarly charitable regarding the soft parts of the animals. One shell in a collection may a few days later do much to discourage collectors if the soft part of the animal is not removed. The soft parts may frequently be removed by tweezers, or a hooked piece of wire. This may not always be well done, but shells buried a few days in an ant hill or hidden in some out-of-the-way place where fly maggots may get to work may be well cleaned by these insects.

Unwanted hermit crabs, which frequently hide in shells, may be drowned by immersion in fresh water for a while, and may then be easily removed if they do not remove themselves in the process.

Some shells may be boiled for from two minutes to a half hour without harm, and the meat then may be removed. Shells with polished surfaces should be dropped in boiling water and allowed to remain there no longer than three minutes if boiling is to be resorted to as a speedy cleaning process. If a shell does not get thoroughly cleaned, the remaining fragments of meat may be cared for by adding a few drops of ten percent formalin to the shell. If one is not interested in preserving color, shells may be bleached in commercial Chlorox. If carefully used, muriatic acid may be helpful in cleaning up parts of some shells, but it should not be used freely.

In cleaning shells, unattached hard parts, such as the operculums of some gastropods, should be kept with the shells. These may be glued to the shell. If one wishes to keep bivalves so that their hinges and ligaments remain pliable, this may be done by soaking the flexible parts in a weak solution of calcium chloride, glycerine and water. An old toothbrush, steel wool, and a scalpel will be useful tools in cleaning parts of shells.

When shells have been reasonably cleaned, some prefer to polish and lacquer them to bring out the bright colors, even though this gives them an unnatural appearance. Ordinary oil, vaseline or shoe polish, or a thin layer of gum arabic, may be used in this process. Many collectors prefer to see their shells as natural as possible.

Beautiful shells are attractive no matter where they are, but few collections are so arranged as to be most useful. Collections and exhibits may be made for various purposes, and these will influence what is done with collected and cleaned shells. Some of the phenomena that a collection of shells might illustrate are:

A systematic group, with related kinds together. (This is probably the commonest kind of organized collection.) A collection showing geographic associates and sources. An arrangement showing seasonal and age variations. An assemblage exhibiting all available inhabitants of a mud flat, a rocky point or some other ecological unit. Arrangements showing food and enemy relationships.

Exhibits of shells used as bait, as money, in making primitive Indian implements are interesting. Other groupings might be the cockle shells, which figure in nursery rhymes; shells mentioned by some author in his prose or verse; species believed to have religious significance; and those with commercial sale value to other collectors because of their beauty or rarity.

Assemblages of shells of one color, even though of different species, may often be highly effective.

The shells brought together under these categories may be filed in cabinets if they are available. They may be put in cellophane envelopes with a label if one is crowded for space. The envelopes may be stapled shut or fastened with Scotch tape and the shells inside may be examined with little danger of their becoming mixed with other shells. Data may be written on many shells with India ink, or small typed legends may be fastened on with Scotch tape or household cement.

Study Nature in the Outdoors

Allegany School of Natural History

Allegany State Park, New York

"The School in the Forest"

A Summer School of Field Biology
Offers College Credit Courses
Botany, Zoology, Ornithology, Conservation and Nature Study Methods

14th Season—July 1-August 10, 1940

For illustrated booklet address

Miss Esther W. Eno, School Registrar
Buffalo Museum of Science
Buffalo, New York

RANGELEY LAKE HOTEL
AND COTTAGES

PRIVATE ESTATE on beautiful Rangeley Lake, all sports at your door, famous food, unstinted comfort and service, delightful social life—here's your Maine vacation at its thrilling best! No hay fever.

Write Charles B. Day, Managing Director, P. O. Box 4, Rangeley Lakes, Maine.

N. Y. OFFICE: 11 W. 42 St. BRy. 9-6348

BOWS·ARROWS·MATERIALS

HANDBOOK—How to Make and Use Bows and Arrows—90 Pages well illustrated (with catalog) 35c.

CATALOG—100 pictures—color spread—Instruction Folder. 10c.

CATALOG alone 5c. Stamps or Coin.

L·E·STEMMLER·QUEEN VILLAGE·N·Y·

PYRAMID LAKE CLUB
in the Adirondacks

A veritable paradise for nature lovers, located in the heart of thousands of acres of wild, unspoiled forest land.

Abounding with native plants, bird and wild life. Scenic possibilities unlimited for the amateur, and professional photographer.

Excellent Trails. Main Club House and Cottages. Stone Fireplaces. Modern Conveniences.

Bountiful meals, congenial people, select clientele. For further information address:

C. D. DAVIS
Pyramid Lake Club
Paradox P. O., N. Y.

Some may wish to try to reproduce small habitat groups. Delightful small units may be made from boxes such as chalk boxes. If the inside is first painted black or dark gray, this may help the illusion. Then soft plaster of Paris is poured in to provide a first base. Before this hardens, sand, mud, seaweeds, sticks, or shells are placed in positions similar to those in which they would naturally be. When the plaster hardens most of this material will be held in position. Appropriate mud or sand may well be worked into the upper layer of the plaster. If some things are to be represented as swimming through the water, these may be suspended on the ends of pins or wires fixed firmly in the bed of plaster before it hardens. Seaweeds, first cured with formalin and then dried or stiffened with paraffin, hold their shape well.

The illusion of water may be further brought out if the open top of the box is covered with cellophane. If one or more layers of cellophane are used and these are not stretched too tightly they cause an apparent distortion of outline similar to that caused by the uneven surface of water.

A school room supplied with boxes of this sort, showing what may be found in different kinds of seashore environment, will be much more interesting than one supplied only with books. If one wishes to keep shellfish alive for study, directions for maintaining a salt-water aquarium were given on the School Page of Nature Magazine for February, 1940.

Photographic Laurels

Although we did not know it at the time of going to press, the prize-winning picture entitled "Esprit des Bois", published in our Camera Trails department in the April issue, was given the Grand Award in the Boston International Salon of Nature Photography, held from February 5 to 18 under the auspices of the New England Museum of Natural History. This picture was made by H. H. Sheldon of Bend, Oregon. This first Salon was composed of 233 prints carefully selected from more than 700 submitted.

Muir Essay Contest

Made possible by a special gift to foster an appreciation of Nature, a John Muir Nature Essay Contest was announced some months ago by Claremont Colleges, Claremont, California. Manuscripts submitted in the contest, which closed February 1, numbered 148. First prize award of $100 was made to Mrs. Harriet Pulver, Torrington, Connecticut, for an essay entitled "Sparrows and Dishwater". Second prize of $75 went to Janet Armstrong Moore, Cavecreek, Arizona, and third award of $50 to Woodbridge Williams of Claremont, California.

Clematis Collection

During his lifetime, J. E. Spingarn was America's leading specialist in the study of and work with clematis. He had accumulated a large correspondence, bibliographical material, herbarium specimens, photographs and lantern slides relating to his specialty. Mr. Spingarn passed away last July and his widow, Mrs. Amy Spingarn, has now presented this entire collection to the New York Botanical Garden.

Master of just about every picture you'll meet

With this Kodak Monitor's swift lens at your fingertips, you get splendid snapshots on clear days, surprisingly good ones even under adverse light conditions. Because your 1/400-second Supermatic shutter "stops" most action, you can snap people when they're on the go, get pictures so informal and spontaneous that they fairly live.

Picture size is big, so you can take superb landscapes and group pictures. And to make your picture taking simpler and surer, there's a film-centering mechanism, double-exposure prevention device, exposure-counting scale, body shutter release. At your dealer's . . . Eastman Kodak Company, Rochester, N. Y.

PRICES . . . With Kodak Anastigmat Special *f*/4.5 lens and Supermatic shutter, Kodak Monitor Six-16, for 2½x4¼-inch pictures, $48.50. Six-20 model (2¼x3¼-inch pictures), $42.50.

KODAK MONITOR SIX-16 (f/4.5 Special)

Going to the New York World's Fair? Take your Kodak—visit the Kodak Building—see the Greatest Photographic Show on Earth.

ONLY EASTMAN MAKES THE KODAK

Keep and Show Your Snapshots

This New, Better Way . . . with FOTO-TAINER!

Avoids all the keeping up an fuss and bother of old-fashioned album

THE FOTO-TAINER way is so simple, easy and satisfying that it's a wonder nobody ever thought of it before. The handy pockets of one compact FOTO-TAINER will take care of *six times as many snapshots* as a much more bulky album—and the prints in each pocket can be slipped out instantly to be "passed around."

People like to look over pictures if they don't have to hold and "wade through" a thick, heavy album. FOTO-TAINER enables you to keep pictures on each subject in separate pockets, and hand each person just the prints he wants to see—your last vacation trip, the latest snaps of the baby, etc., etc. Several guests can thus look over your camera work at the same time. FOTO-TAINER gives *everybody* the maximum pleasure from pictures!

No More Messy Pasting!

Don't waste any more time and patience pasting up page after page of prints in a bulky, unhandy album—fussing with tabs—constantly having to fix pictures that come loose—and laboriously lettering titles with white ink or pencil. With FOTO-TAINER you can note titles quickly on the backs of the pictures, classify them in separate packets, and you're done. Besides, you can "weed out" those no longer interesting and *rearrange your whole collection in a few minutes!* Also, FOTO-TAINER allows you to put in additional leaves as your stock of prints grows.

Why This Way Doubles Your Picture Pleasure

No pasting, tabs or fuss

No white ink or pencil needed for titles. Write them on backs

You pass the prints, not the album

Several people can see pictures at once

Special groups kept together

Snapshots can be taken out and rearranged, or discarded, at any time

Keeps six times as many prints as an album

New leaves can be added

Negatives can be kept with prints, if desired

With the FOTO-TAINER you can take a greater pride in your pictures and win the admiration of your friends when you show them this new, *handier* way. And the handsomely bound FOTO-TAINER is a really decorative addition to your living-room table.

You cannot fully appreciate the convenience of this new way of keeping snapshots until you actually see a FOTO-TAINER.

SMALL SIZE has 6 removable leaves providing for 250 pictures of all sizes up to post-card size. (Extra leaves obtainable.)

The LIBRARY SIZE has 6 removable leaves, providing for 500 pictures of all sizes up to post-card size. (Extra leaves obtainable.)

NATURE BOOK DISTRIBUTORS
1212 Sixteenth St., N. W., Washington, D. C.

Gentlemen: Please send me the FOTO-TAINERS I have checked below. My (check, P. O. Money Order) for $..... in full payment is enclosed. These FOTO-TAINERS are fully guaranteed and if I am not completely satisfied I will return them to you and will receive a refund in full of the purchase price.

(Check squares before price of FOTO-TAINERS you want.)

	Imit. Leather	*Genuine Leather*	*Antique Cowhide*
Small	☐ $2.00	☐ $2.75	☐ $3.50
Library	☐ $2.75	☐ $3.75	☐ $5.00
Slide-in-back, 40 to start	☐ $4.00	☐ $6.00	☐ $7.50

NAME.....

ADDRESS.....

CITY..... STATE.....

ON THE RECORD

One of the most comprehensive and complete musical appreciation courses ever devised for elementary, intermediate, and high school students was announced last week by Ginn and Company, publishers, in conjunction with RCA Victor.

Entitled "Making Friends With Music", the course is based on the assumption that the best way to teach appreciation of music is to let the music speak for itself. Accordingly, each of the four pupils' books offered is accompanied by a complete and descriptive unit of Victor records, carefully selected and coordinated with the text. Records are taken from the Victor catalog, although special couplings have been made so that both sides of each record are used and there is no waste material.

"Making Friends With Music" is the product of two years of study under the supervision of William C. Hartshorn, assistant supervisor of music, Los Angeles public schools, and Helen S. Leavitt, director of music at the Wheelock School, Boston, according to Ginn and Company spokesmen.

"The approach of this course is always through the music," says Ellsworth C. Dent, director of the RCA Victor educational department. "Each musical composition studied is heard as a whole and without interruption before it is broken up into parts for more detailed study. Throughout the course emphasis is placed upon the student's understanding and enjoyment of music rather than the gathering of facts about music, or drill in recognizing different features which may be considered as technical aspects."

Pupils' books are simple and informal in style and provide up-to-date comments on composers, arrangers and performers. In addition, special information about backgrounds and countries involved, illustrations, explanations of orchestral scores, and historical discussions are included. Each book is aimed at a desire for greater musical experience and an increasing sense of familiarity and sensitivity to all kinds of music.

The course is accompanied by two books for teachers embodying suggestions for procedure, additional material and bibliography. They are designed to make the course a simple matter even to untrained teachers.

•

We have commented before on the interesting group of songs-for-children records, so many of which draw largely or entirely upon Nature for their themes. To be added to those already recommended is a large-size recording of ten delightful little songs made by Anna Howard and Edna Brown, soprano and contralto respectively. Of the ten songs we found "Who Has Seen the Wind", "The Snow", and "The Little Turtle" particularly charming. A fine addition to the juvenile record library. The youngsters will wear this one out. (#36033-A)

•

This department is edited to inform readers on current records of special Nature interest. It is also ready to answer any questions with respect to special types of recordings, particularly for those readers to whom a well-stocked music store is not immediately available.

Amazing New Liquid
GROWS PLANTS LIKE MAGIC!

Try the new Liquid Vitamin B_1
Everybody is raving about!

Ten-inch dahlias on 12-foot plants! Five-inch rosebuds! Daffodils as big as salad plates! Shrubs, flowers, even young trees transplanted without sign of setback! Gardener's daydream? Absolutely not! Actual results obtained by thousands of gardeners . . . amateur and professional . . . with VITA-CULTUR, the wonder-working liquid vitamin B_1! Try VITA-CULTUR now . . . on your own house plants, garden flowers, trees and other perennials! Watch wasted ferns revive . . . seedlings grow with astonishing vigor . . . begonias, ivy, other foliage plants attain tropical luxuriance! Give plants a chance . . . with VITA-CULTUR!

THE ONLY LIQUID VITAMIN B_1 ENDORSED BY DR. STANFIELD

Don't take chances with an unknown product. "If you want uniformly excellent results with B_1," says Dr. J. F. Stanfield, famous plant physiologist, "certainly VITA-CULTUR will bring them, since no better source of this strangely effective material is available on the market today." VITA-CULTUR is a table, scientifically-sound solution, based upon countless plant experimentation. VITA-CULTUR contains a scientifically-determined ratio of crystalline B_1 in every drop!

VITA-CULTUR IS SIMPLE AND SAFE TO USE

You needn't be a professional horticulturist to get outstanding results with VITA-CULTUR. Just add a few drops to ordinary sprinkling water and use according to simple and clear directions. VITA-CULTUR, in 50c size, will vitamize 250 gallons of water . . . in $1.00 size, 500 gallons. Or in the big, economical $5.00 size, 3000 gallons. Take the first step toward making your garden the show-spot of your neighborhood. Order your supply of approved VITA-CULTUR today. Use the coupon below. You need send no money. Simply pay the postman for your order plus postage and C.O.D. costs. If you send cash with order, we pay postage. Don't delay! Mail the coupon today!

FREE TO GARDEN CLUBS

If you belong to a garden club, have your secretary write for Dr. Stanfield's Illustrated 15-minute Lecture, "Plant Hormones and Vitamins." It will make a splendid program for your next meeting. Send no money. Lecture is free. Simply use the space in the coupon below. Or write VITA-CULTUR, Dept. 130, Evanston, Ill.

VITA-CULTUR, Dept. 130, Evanston, Illinois

Please send me ..... bottles of VITA-CULTUR in (Check here)

- ☐ 50c size (for 250 gallons of water)
- ☐ $1.00 size (for 500 gallons)
- ☐ $5.00 size (for 3000 gallons)

☐ Send C.O.D. ☐ Payment enclosed

Name.....

Address.....

City.....State.....

Send Dr. Stanfield's lecture to:.....

Address.....

BATTLING THE BUGS ON THE GARDEN FRONT

(Continued from page 356)

themselves to any old litter or debris. Look out for their yellowish-white cocoons throughout the month of June. Late during that month the moths emerge to add to the troubles of another garden year.

Plenty of these ever-hungry creeping menaces are to be found wherever there are crabapples, wild cherry trees, hawthorns, and other trees preferred by this pest. We used torches to burn their nests when we discovered them. But it hurt the trees as much as the worms. I had Boy Scouts collect the egg masses easily visible to the trained eye. We sprayed the trees that held the eggs the year before. But the best method yet employed to fight this menace is to find the cocoons and burn the egg masses.

Now we come to the boring insects. We seldom know that they exist until they have done their dirty work. The iris borer, the borer that attacks peach and plum trees, and the stem borer that raises havoc among the dahlias are the most troublesome. In the case of the iris borer we simply lift the whole clump, divide it and ruthlessly cut out the infested parts. It takes courage, but better by far to have fewer irises the next year than to be pestered by that filthy garden inhabitant. The liberal use of sulphur and tobacco dust will discourage his reappearance.

On our peach trees we use stiff wire and a knife. After the borers are located a few drops of carbon bisulphide placed in the old channels will usually clear them. Be sure to seal the holes promptly with putty or mud to give the gas created a chance to do a good job. We lost many a fine dahlia plant before we learned that it is better to use the knife than to try to reach the borer otherwise. Depending on how far up the stalk the borer has traveled, split the stalk to get him, after which tie the opened portion with soft twine or raffia.

Among the most troublesome garden pests are root maggots and root aphids. The best remedy I know for the maggots is a carbolic acid emulsion. One pint of crude carbolic acid should be added to a pound of soap dissolved in boiling water. This, in turn, should be diluted with a gallon of hot water and stirred thoroughly. It will be of the consistency of thick cream but will do the work. And when it comes to ants we have found "Antrol" the utterly dependable defense against all kinds, either in the house or outdoors.

As already intimated, this country has so many thousand harmful species and varieties of insects, that it is utterly impossible to deal with the subject within the limitations of an article. Plenty of books on the subject are available for those who take the garden seriously. Among them *The Plant Doctor* by Cynthia Westcott, published by F. A. Stokes and Company, is a good one. The most important factor to bear in mind in all this bug fighting is to do the work thoroughly! Whether you spray or dust or kill with poisons applied locally, do the job well. And remember, if you please, that an ounce of prevention is worth pounds or gallons of remedies. Keep your garden clean and you will find it is a dividend-paying proposition.

Adolph Kruhm, Garden Editor of Nature Magazine, is at the service of our readers.

BRINGING UP FLOWERS

SUDDEN DEATH to Aphis

4005

"BLACK LEAF 40"

Mix 1½ teaspoons of "Black Leaf 40" with 1 gallon of water, add a little soap, and spray. This is an efficient and economical insecticide. Also effective for leafhoppers, leaf miners, most thrips, young sucking bugs and similar insects.

KILLS BY CONTACT AND BY FUMES

"Black Leaf 40" is economical — "A little goes a long way." The fumes as well as spray are effective.

Insist on original factory sealed packages for full strength.

Tobacco By-Products & Chemical Corp., Incorporated
Louisville, Kentucky

"Black Leaf 40"

LOOK FOR THE LEAF ON THE PACKAGE

GROW BETTER ROSES

TRI-OGEN, the combination spray, helps give you better roses. Controls black-spot and mildew; kills many insect pests. Keeps foliage strong, vigorous. Economical, easy to apply—just mix with water and spray. Buy at garden supply stores, or write for free helpful bulletin.

ROSE MFG. CO., 257 Ogen Bldg., Phila., Pa.

TRI-OGEN

IRIS from California. New introductions, rare varieties and wide color range. Thrive anywhere. Safe delivery *guaranteed*. New 1940 color catalog describes 250 varieties, free.

MILLIKEN IRIS GARDENS
Dept. 3, 970 New York Ave., Pasadena, Cal.

CONTROL GARDEN INSECTS with Mechling's

PYROTE REG. U. S. PAT. OFF.

A Liquid Spray

This concentrated ROTENONE-PYRETHRUM SPRAY is efficient, economical and easy to use. Controls Rose Bugs, Aphis and many other chewing and sucking insects infesting flowers and vegetables.

SULROTE REG. U. S. PAT. OFF.

Contains 0.80% Rotenone

This Rotenone-Sulfur Dusting Mixture is very effective for Gladiolus Thrips, Black Spot and Mildew on Roses, also Mexican Bean Beetles. Convenient *push-pull duster* package for economical use.

Get these products at your dealers today or write to Dept. 615

MECHLING BROS. CHEMICALS
DIVISION OF GENERAL CHEMICAL COMPANY
TWELVE SOUTH TWELFTH STREET
PHILADELPHIA, PA.
SALES OFFICES IN PRINCIPAL CITIES

Lightning—A Biography

"If you heard the thunder, the lightning did not strike you. If you saw the lightning, it missed you; and if it did strike you, you would not have known it." Such reassurance comes from Dr. K. B. McEachron and Kenneth G. Patrick in both the opening and closing paragraphs in their book, *Playing with Lightning*. If your interest in lightning ends with this knowledge, however, you will be missing a most fascinating volume; a book that is, in fact, a sort of biography of this physical phenomenon. In this popular presentation we find the whole story of what we know about Nature's lightning, and of man's experiments with it and with his own product. We learn that Benjamin Franklin was taking a much greater risk than he knew with his kite-flying venture; what is heat lightning and what is ball lightning; where lightning comes from and how it is formed; whether we should stand before a fireplace, take a bath, go swimming, or stay in a steel automobile during an electrical storm; how useful lightning rods really are; whether lightning ever strikes twice in the same place. We learn also of man's many and interesting experiments in this field. Here is fascinating reading about a subject little known to the average individual. The book is published by Random House at $2.50.

Trees and Shrubs

In *The Home Book of Trees and Shrubs* J. J. Levison has written a book for the average home-owner who wants to know what trees or shrubs to plant; where and how to plant them; how to care for them; what insects and diseases attack them, and how to plan this phase of the home surroundings. The author seems to have overlooked nothing, supplying photographs, landscape diagrams and designs, and sketches to supplement his popular text. It is a book of large size, with 424 pages. It is a permanently valuable addition to the library. Published by Simon and Schuster, the price is five dollars.

Cats

To her earlier book on cats, Miss Ida M. Mellen adds a second feline volume entitled *The Science and the Mystery of the Cat*. The book represents the fruition of a quarter of a century of study of cats, their history, their lore, their characteristics and many other interesting facts relating to them. While Miss Mellen's first book was primarily a practical one designed to aid the amateur and professional cat owner or breeder, this second volume treats with cats generally. It is a book that cat lovers will welcome. Published by Scribners, it sells for $2.75.

Garden Book Contest

Competition for garden book writers is announced by the Macmillan Company, with an award of $1000 for the successful manuscript. Competition will close November 30, 1940. Brochures giving the conditions of the contest, together with entry blanks, may be secured from Prize Garden Book Competition, The Macmillan Company, 60 Fifth Avenue, New York City.

NATURE IN PRINT

(Continued from page 319)

Wabash, he says, is "the things a Hoosier remembers when he hears that magic name," and these are the things he tells. This, like *Where the Waters Meet*, is an excellent book but of a much different kind. Many of us will prefer Dorrance's kind of book, because like him we like to be close to rivers. Mr. Wilson says, "A man must go and look at the river now and then," but Dorrance launched a boat on it.

The Martin Johnsons

"Here, in a story about everywhere else in the world, is romantic Americana that will one day be history. These pages are themselves adventure. Here the watchmaker's boy from Independence out in Kansas meets the Santa Fe engineer's daughter from Chanute, plain people from the prairies. Against that homespun background is woven a life and career filled with exotic color."

This is the opening paragraph of the introduction written by F. Trubee Davison, president of the American Museum of Natural History, for *I Married Adventure* by Osa Johnson. This book tells the story of the lives and adventures of the author and her husband, whose untimely and tragic death came in an airplane crash. Mrs. Johnson says, in her dedication: "With all my love, I dedicate this book to the memory of my husband, whose work will be an everlasting monument to his heroic dreams and indefatigable spirit."

It would be futile, within the limitations of a necessarily brief review, to attempt even to suggest the adventures in Borneo, Africa, the Belgian Congo and elsewhere. In fact, this 376-page book rather defies the reviewer to dip in and pick out incidents for citation. There are too many of them, and it is better, therefore, to urge the reading of this story of adventure.

Physically it is a fine piece of book making, with the text supplemented by 83 photographs reproduced by the aquatone process. The J. B. Lippincott Company is the publisher, and the price is $3.50.

More on Soilless Growth

The literature on soilless gardening, hydroponics, nutrient solution propagation, or however you may choose to style it, is growing apace. The most recent book to come to hand is that entitled *The Complete Guide to Soilless Gardening*. It is the work of Dr. W. F. Gericke, pioneer in this field and a man whose experimentation has contributed probably as much as any one, if not more, to developments of the last decade. In this book, therefore, he makes a report of progress, and presents the entire story in simple form for the average individual to read and apply. Using the advice contained here one would not have to make the mistakes of the early experimenters and would be able to build upon the knowledge thus far acquired. What the possibilities may be for this activity in the economic sense seems still to be subject to debate. Certainly, however, it has possibilities, and soilless growing does contain the drama of the unusual. Published by Prentice-Hall at $2.75, Dr. Gericke's book should be in the hands of all interested in this subject.

Brief Review

THE STORY OF FLYING, by Archibald Black; 268 pages; 66 illustrations; published by Whittlesey House, McGraw-Hill Book Company; $2.75.

Flying, from the first aviatorial daydreams of Daedalus and Icarus to the aircraft that designers promise us for tomorrow. Entertainingly written and factually valuable.

WALL SHRUBS AND HARDY CLIMBERS, by W. J. Bean; 182 pages; 47 illustrations; published by Macmillan; $2.25.

A book of horticultural specialty by the late Curator of the Royal Botanic Gardens, Kew, England.

AERIAL PHOTOS, by Claud J. Dry; 68 pages; drawings; published by the Aircraft Directory, Athens, Ohio; $1.00.

How to make and sell aerial photographs and how to build and use cameras for this specialized purpose.

GARDENS OF CHARACTER, by Marion Cran; 284 pages; 24 illustrations; published by Macmillan; $3.00.

Charmingly written story of gardening in Britain, with as much story and outdoor philosophy as there is gardening.

DESERT WILD FLOWERS, by Edmund C. Jaeger; 322 pages; photographic and line illustrations; published by Stanford University Press; $3.50.

Guide to 764 desert plants based upon 25 years of study. Most complete work on the flora of the far southwestern American deserts.

THE METEOROLOGICAL GLOSSARY, third edition; 250 pages; maps and cloud pictures; published by the Chemical Publishing Company, $3.00.

Complete guide to terms and concepts met in meteorology.

RUBBER LATEX, by H. P. and W. H. Stevens, 224 pages; illustrations; published by the Chemical Publishing Company; $2.00.

Up-to-date information on an important product in our current economy.

AN INTRODUCTION TO ASTRONOMY, by Robert H. Baker; 316 pages; photographs, drawings and charts; published by D. Van Nostrand Company, Inc.; $3.00.

Second edition of a splendid book of proved value for one-semester, non-technical courses in the study of astronomy from the beginning.

GARDENING WITHOUT SOIL, by A. H. Phillips; 138 pages; eight pictures; published by the Chemical Publishing Company, New York City; $2.00.

Concise summary of progress and relatively simple discussion of the manners and methods of this interesting gardening activity.

SOME GLEANINGS FROM LIFE, by Dr. Robert E. Truhlar; 252 pages; published by the Christopher Publishing House, Boston, Mass.; $2.00.

Philosophical and critical discussion of the way in which man has misused the forces that shape life. Stimulating to the thoughtful reader.

As a convenience to readers the books reviewed in the pages of Nature Magazine may be ordered through the book department of the American Nature Association, 1214 16th St., Washington, D. C.

Dartmouth Trains Leaders

Through the office of the College Naturalst, which was established in 1938, Dartnouth is providing a new type of extraurricular training. Thirty students from arious departments of the College are learng the many ways to adapt college biology nd field experience to a camp Nature proram. These boys are working with Dr. ichard Weaver, the College Naturalist, a raduate of Cornell University and the Penn tate School of Nature Education. They are earning how to use Nature photography in camp program; how to establish Nature rails and museum exhibits; how to care for ild animals; how to organize field days and mpfire programs with Nature as the theme; ow to keep Nature diaries and camp logs as to collect and preserve valuable natural istory information. The equipment needed, he most useful references, and the objectives f a camp Nature program, are also included n this new non-credit course.

Many of the thirty students are already mployed as Nature counselors and are inerested mainly in improving their experience o as to conduct better programs next sumner. Other members of the class are biology najors who are finding in the course much naterial that cannot be obtained from regular college curricula.

Students with adequate training in biology nd some former experience in camp work ill be available to camps that are anxious o inaugurate an active Nature program, or o improve the present program. Less experinced students will gain experience in some f the many camps near Hanover, New Hampshire, and be ready to accept more responsible positions after another year in the course. Others lacking biological background will be dvised to attend one of the many valuable ield schools of natural history.

What, No Soil?

Not much more than a year ago we remarked, in reviewing one of the first popular ts on soilless growth, that we were glad have a book to which we could refer inirers seeking more information on this subct. Since that time the available bibliography this field has grown with amazing rapidity. us far the books that have come to us for view have all been excellent ones, written men who have experimented long and efully with growing things without benefit soil. The most recent book is no exception it is written by Alex Laurie, Professor Floriculture at Ohio State University, here much of this work has been done. The ook is entitled *Soilless Culture Simplified*, nd the title is descriptive. Published by Whittlesey House, McGraw-Hill Book Comany, this book sells for $2.50.

Zion and Bryce

With five colored pictures of scenes in ion and Bryce Canyon National Parks, the ird bulletin of the Zion-Bryce National istory Museum is one of which that organation may well be proud. Here is a thirtyx-page booklet presenting a geologic and eographic sketch of these two parks. It is ritten by Herbert E. Gregory of the United ates Geological Survey. Copies may be obined from The Park Naturalist, Zion ational Park, Utah, for twenty-five cents.

Bean's Saddle Sport Oxford

Made of white elk with brown calf saddle. Full leather lined counter with white drill vamp lining. Dark red rubber gristle sole that will outwear leather. Men's: $4.85, ladies': $3.85 postpaid. Send for free sample of leather and sole and new spring catalog.

Men's $4.85 Postpaid

L. L. Bean, Inc.
259 Main Street
Freeport, Maine

Mfrs. Fishing & Camping Specialties

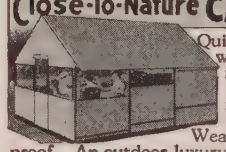
Keep Your Dogs FREE FROM WORMS
WRITE FOR FREE BOOKLET No. 652

NEMA WORM CAPSULES

EFFECTIVELY REMOVE LARGE ROUNDWORMS AND HOOKWORMS IN DOGS OF ALL BREEDS AND ALL AGES. DEPENDABLE

Nema Booklet tells you about worms
Write to Animal Industry Dept., Desk N-21-F
PARKE, DAVIS & CO., DETROIT, MICH.
Drug Stores Sell Parke-Davis Products

Close-To-Nature CANVAS HOUSE



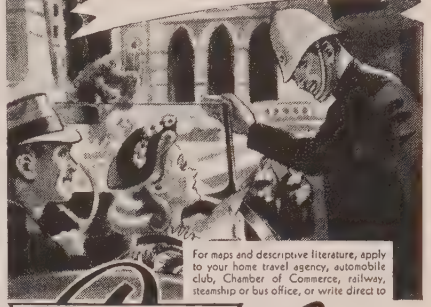
Quickly erected or taken down without tools. Canvas permanently attached to the frame. Shutters sliding in metal grooves regulate ventilation. Waterproof. Weather tight. Screened insect proof. An outdoor luxury. Circular free.
The Monroe Co., 26 Bridge St., Colfax, Iowa

WE
Pamper Mortals
ON VACATION AT
POCONO MANOR

Excellent golf, riding, swimming . . . indoors and outdoors filled with entertainment for everybody—that's P.M. for your summer vacation. Delightfully cool, friendly and informal. Farm-fresh food. Bring the family to the top of the Poconos for the summer.
HERMAN V. YEAGER, General Manager
POCONO MANOR, PA.

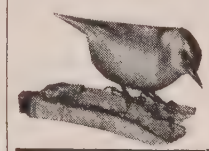
---

contrast... atmosphere... gaiety... a
French Canadian vacation.



For maps and descriptive literature, apply to your home travel agency, automobile club, Chamber of Commerce, railway, steamship or bus office, or write direct to

LA PROVINCE DE Québec
TOURIST BUREAU
QUÉBEC • CANADA
T 46



A new bird book by the author of THE ABC OF ATTRACTING BIRDS.

WILD BIRD NEIGHBORS
By Alvin M. Peterson

LEARN how to become expert in identifying the birds you see and hear while hiking, picnicking, or puttering around your own yard. This book will show you. Lively, entertaining style; excellent illustrations. $2.00

At your book store, or direct from
THE BRUCE PUBLISHING COMPANY
3106 Montgomery Bldg. Milwaukee, Wis.

DUDE RANCHES
FREIGHTERS
NATIONAL PARKS

Get a better vacation this year. Learn the best places in all 48 States and Canada to vacation. See how easily you can visit the national parks, how far you can go in 2 weeks or longer. Get concrete facts on seeing Gaspé, Hawaii, Alaska, Mexico, etc. Learn about dude ranches, trail riding, state parks, national forests, camping, mountain climbing, economy trains, scenic auto, bus and rail routes, etc. Send for Complete Vacation Guide to All America. Costs only 50c, but it's your insurance for a better vacation. Send coin or stamps to Harian Publications, Dept. DA, 270 Lafayette St., N. Y. C.

You'll Also Want:

"TRAVEL WAYS," a DIRECTORY to 500 completely planned, low-cost vacation itineraries via bus, rail, youth hostels. Includes the only complete guide to freighters and other ships (Great Lakes $35; Mississippi Cruise $50, etc.)—25c.

"HOW TO TOUR THE U. S. IN 31 DAYS FOR $100"—50c. (Based upon first-hand knowledge; complete with budget and day-by-day schedule.) "Detailed enough to follow to the letter," writes Sunset Magazine.

ALL THREE BOOKS FOR $1.

Natural Bridge
OF VIRGINIA
One of the Seven Natural World Wonders

Accommodations FOR EVERY CLASS OF TOURIST

HOTEL $1.50 Rooms and up
COTTAGES $1.00 Double Rooms per Person

IN THE SHENANDOAH VALLEY

J. LEE DAVIS, PRES. & GEN. MGR.
NATURAL BRIDGE, VA.

CAMERA TRAILS

(Continued from page 315)

of North Lake, Wisconsin, and "Male Least Bittern" by Mr. John J. Stophlet of Toledo, Ohio. The runners-up were made by our most regular contributor, Mr. Halliday of Toronto, by Mr. Stophlet, and by Lawrence D. Hiett, also of Toledo.

My most sincere congratulations to the winners.

Each of the five pictures shows real skill not only in photographic excellence but in proof of the patience and knowledge of the maker in arrangement and timing. In the next issue I will try to explain why the judges have chosen as they have in selecting the winners to date. Maybe it will help you in the last few months of the contest.

Remember that your entry may bring you any of the following books as a monthly winner, and the one best print selected at the end of the contest will win for its maker a $25 merchandise award from Willoughby's, Inc. Send you entries to me at 320 East 42nd Street, New York City. Remember, too, that the November contest will be confined to flowers and plants. Entries must be in my hands before September fifteenth. Send yours now!

The prize book list:

Photo Lab Index, Henry M. Lester; *Nature Photography Around the Year,* by Percy A. Morris; *New Ways in Photography, or Finding New Subjects for your Camera,* Jacob Deschin; *The Fun of Photography,* by Mabel and Mario Scacheri; *Eyes in the Night,* by Tappan Gregory; *Photography,* by Dr. C. E. K. Mees.

This and That

One of the most helpful booklets that have been published in the last year is the new *Agfa Photographic Papers* from the Agfa Ansco Corporation, Binghamton, New York. It has, in addition to details of the various Agfa papers for contact printing and enlarging, a great deal of information on selecting the right grade of paper—something to which I have given much space in Camera Trails from time to time—developing and toning the print, and a number of suggestions that will be worth studying. Your dealer has your copy, which sells for 15c. If his stock is exhausted, write direct to Agfa for yours enclosing the amount and mentioning this department.

One of the most useful additions to our dark room equipment in the past year is the Eastman Projection Print Scale. It is a pie-shaped set of step wedges arranged in a circle and numbered. The scale is placed on the printing paper when you are making an enlargement and the image is projected through it. After an exposure of one minute has been given and the print developed, the numbers on the wedges may be read and that corresponding to the part of the image that looks best is the exposure required expressed in seconds.

Another Eastman contribution to our pictures is the new exposure calculator designed for movie cameras but valuable for stills as well. The new Universal Guide is intended to be attached to the camera and will accommodate cards with the scales necessary for different films. It too may be obtained from your Kodak dealer. If he does not have these two picture aids, write for information to the Eastman Kodak Company at Rochester, New York.

The Fink-Roselieve Company of 109 West 64th Street, New York City, has introduced an excellent, low-priced spotlight for portraiture and other indoor photography. Called the F-R Hi-Spot, it uses a special 150 watt bulb and gives a fine, soft light. Don't forget to mention this department when you write to the makers for information on the Hi-Spot.

The Burke and James Company of 223 West Madison Street, Chicago, Illinois, have a new catalog of bargains. It will be sent to all readers of this department who ask them for it.

With the arrival of summer with its greater opportunities for outdoor pictures, the question of filters gains in importance. The right filter can add tremendously to the effect of your pictures, but to use them properly, we need authentic and complete data on just what any color or density will accomplish. This is furnished as compactly and definitely as one can imagine in the new Utilo Filter Booklet recently published by Photo Utilities, Inc., of 10 West 33rd Street, New York City. The 16-page Utilo booklet covers the various colors that are generally used and their effect with various films as well as filter factor tables for most films. For your copy send ten cents in stamps to the above company and remember to tell them you heard of the booklet in Camera Trails.

Have you investigated the possibilities of polaroid? In addition to the elimination of undesirable reflections, the polar filters do nice things for clouds and are valuable for many effects. Get your dealer to show you how the filter works on your camera.

If you use different kinds of films from time to time, you probably get mixed up occasionally and give incorrect exposures. I have avoided this trouble since I adopted the plan of sticking a small piece of adhesive tape on the back of the camera whenever I load it with anything except my regular medium speed pan film. On the tape I write the identification of the film with a pencil. If there is no tape, I know the film is my usual kind.

Camera Trails is given space in Nature Magazine for you. Its columns should provide just the information you want, and it should be as valuable to you as it can be made. This can be true only if you do your part, and let me know what you would like to find here. Let me have your suggestions. Remember, too, that I will be glad to help you solve your photographic problems. Address your communications to Norris W. Harkness, NATURE MAGAZINE, 1214—16th St., Washington, D. C.

PHENCODES, A RARE LUMINOUS BEETLE

BY E. NEWTON HARVEY
Princeton University

Every summer a few specimens of the beetle, *Phengodes,* related to the fire-flies and glowworms, are found by lucky collectors. The male is not luminous, and is winged. It looks much like an ordinary beetle, but the female, shown in the accompanying photographs, is wingless and grub-like. It possesses two rows of bright greenish luminous spots and a row of transverse luminous bands, which glow continuously, day and night. The larva resembles the adult female so closely that the expert can hardly tell the two apart. The upper photograph shows a female crawling, the lower left coiled and resting, while the lower right is a photograph actually taken by the light of the beetle itself.

The animal is found during June and July in dry hilly country, in such open places as are well suited to the growth of blueberries. The author would greatly appreciate receiving living specimens of *Phengodes* for study of the method of light production. They may be sent to him, at the Biology Department, Princeton University, Princeton, New Jersey.

Living Light

For a quarter century Dr. E. Newton Harvey of Princeton has been studying animal light, or living light. He has now brought together in a book, with the title *Living Light,* the results of his researches. The author approaches the subject from the historical point of view; the gradual development of knowledge of the subject and the consequent discarding of superstitions about it. He discusses cold light, light-producing organisms, types of luminescence, chemistry of light production, physiology of light production and the physical nature of animal light. The book is not simplified for general popular consumption but is of definite interest to any layman with an interest in science, and, of course, to scientists by profession. Published by the Princeton University Press, this book sells for four dollars.

About the Boxer

This is not a book on fisticuffs, but about that increasingly popular dog, the Boxer. In fact, this is the title that Dan M. Gordon gives to his discussion of this breed, its origin and history and its care. The publisher is Will Judy and the price $2.50.

California Birds

All of the remaining sheets of the de-luxe sets of William Leon Dawson's *Birds of California* have been acquired by the Devin-Adair Company, New York publishers, and are now available in a handsomely-bound edition. There are four volumes in this set, each book being 12¾ by 10½ by 2¼. There are more than 1400 illustrations, 110 of which are full color plates, the majority of which are the work of Allan Brooks. Dawson's work is known as one of the most significant and valuable contributions to regional ornithology. The four-volume edition sells for $75.

Study Tree Rings

We are indebted to Adolph Dreyer and Nature Notes of the Webster Groves Nature Study Society of Webster Groves, Missouri, for some very practical suggestions on studying and photographing tree rings. The process involves three grades of sandpaper—coarse, medium and fine—and a can of ordinary black shoe polish. Using the coarse sandpaper, Mr. Dreyer advises removing the roughness of the top of the stump along a strip of two inches or so in width from the center to the bark. This is then vigorously rubbed down with the medium sandpaper and smoothed with the fine. Then the capillary tubes and medullary rays will show clearly.

"If now," writes Mr. Dreyer, "a photographic record is to be made of these rings, it will be necessary to increase the contrast between the hard and soft parts of which the rings are composed so that the camera may record them clearly. To do this, take a small amount of the black shoe polish, and, with a cloth, spread it over the treated part of the stump. The hard part will not absorb the black paste, but some will adhere. To remove this rub once again with the fine sandpaper which will again bring to light the natural color of the wood, but will not affect the black paste in the water tubes. Once again, take the cloth, stroke lightly the top to remove the dust caused by the last sandpapering.

"The work is now finished and the rings will be revealed in a most surprising manner. The treated part will have the appearance of a highly-polished piece of furniture, with the rings contrasted in black and white, and the medullary rays coming through with a silvery sheen. Photographs of annular tree rings of tree stumps so treated are decidedly successful, the rings and the capillary tubes forming them showing plainly and in great detail. To do all this work will require about four or five minutes' time."

Photographic Books

Two photography books are at hand for review—*Photographing in Color* by Paul Outerbridge, and *How to Make Good Pictures*, brought out by Eastman. The former, illustrated with fourteen color plates and a color chart, is an up-to-the-minute discussion of progress in color photography. It should find a large audience because of its outstanding value in this new and fascinating field. The Eastman Book, a complete handbook for the every-day amateur photographer, is profusely illustrated and a mighty big photographic fifty cents' worth. Mr. Outerbridge's book, which is published by Random House, is equally worth the price of $4.85 to the color specialist.

CLASSIFIED ADVERTISING

BOOKS

BOOKS ON FORESTRY

FOREST FACTS FOR SCHOOLS

336 pages, 34 illustrations, cloth bound. Book for pupils in Grades 5 to 12. Exercises and new-type tests follow each division of the text matter. $1.00.

FORESTS AND MANKIND

250 pages, 66 cuts and illustrations, cloth bound. Convincing knowledge of the importance of the forests in their historical, social and economic relation to mankind. $3.00.

TREES AS GOOD CITIZENS

268 pages, 16 full color plates, 125 other illustrations, cloth bound. This book tells the whole story of the shade tree. $2.00.

NATURE BOOK DISTRIBUTORS
1214 16th Street, Washington, D. C.

EMPLOYMENT

SALARIED Positions: $2,500 yearly and up (none lower). Let us try to get one for you; small cost. Write for valuable information R-3. **Executive's Promotion Service, Washington, D. C.**

FILMS DEVELOPED

IMMEDIATE SERVICE!—Better pictures. Sixteen guaranteed prints from roll, 25c. One colored or two Plain Enlargements and 8 guaranteed prints 25c. Sixteen reprints only 25c. SPECIAL!—Coupon for 8x10 enlargement given with every 25c worth Kodak finishing. ONE DAY SERVICE! Details and Film Mailers FREE on request. **American Studios, Dept. 10, LaCrosse, Wisc.**

HORTICULTURAL

RED-TONED IRIS. Five varieties including RED WING, only 30 cents, stamps or coin. Ten varieties choice ORIENTAL POPPIES only one dollar. All plants labeled and postpaid. Copy **"Iris News"** FREE. Address **Iris News, Macedon, N. Y.**

INDIAN CURIOS

100 Good ancient arrowheads $3.00; Tomahawk head 50c. Flint knife 25c. Illustrated catalog 5c. **H. Daniel, Hot Springs, Arkansas**

30 *Genuine* Indian Arrowheads, $1.00. Catalog. **Geo. Holder, Glenwood, Ark.**

PHOTOGRAPHY

"HOW TO MAKE GOOD PICTURES". Twenty-third edition now available. Up to date in every respect with details of Kodachrome and Infra-Red photography; new chapters include Stunt Photography, Flower Photography, Night Photography, Indoor Portraiture, Composition and many more new features. At 50c this book still remains at the head of our "must" list. **NATURE BOOK DISTRIBUTORS, 1214 16th Street, Washington, D. C.**

SCIENTIFIC

BINOCULARS, field-glasses, telescopes, barometers, etc., cleaned, repaired, and adjusted. Send glasses for estimate. New and used glasses sold and traded. **W. I. BELZ, Opticians, 2 East 44th Street, New York, N. Y.**

TELESCOPES, Microscopes, binoculars; 1940 bargain catalog free. **BROWNSCOPE CO., 5 West 27th Street, New York.**

MICROSCOPE

REAL Standard Size Microscopes. No junk! Used, Cheap. Stains, reagents; prepared and plain slides and covers. Send stamp for bulletin. **Harry Ross, 70 West Broadway, N. Y. C.**

SEA SHELLS

SEA SHELLS for sale; Land, Fresh Water and Marine. Specify lists desired. **Mrs. F. K. Hadley, 88 Oliver St., Malden, Mass.**

TAXIDERMY

TAXIDERMY SUPPLIES—QUALITY Artificial Eyes, Teeth, genuine Jonas head forms. Tools, materials, etc. Everything for the progressive taxidermist. Send 10c for big illustrated catalog. **Jonas Bros., 1023 Broadway, Denver, Colorado.**

WILD FLOWERS

IN COLORS—60 post cards, 25c doz.; 64 2 x 3 in. stickers 55c; book of 365, $3.95; 50 lantern slides & lecture rented 1 day $3.75 & postage. Books, slides or photos (7000), movie films. Membership & magazine $1.50 a year; Junior Chapters of 25 or more 10c per member. **Wild Flower Preservation Society, 3740 Oliver St., Washington, D. C.**

Have you any WILD FLOWERS in your garden?

These wildings of the woodland add an exotic charm to the shaded corner or the spot you had not known how to treat.

BUT to grow wild flowers you must know their needs of soil and care. Many of our rarer wild flowers have become so because they have not been gathered with care. Seeds of many are now available, and you may wish to save a clump of some kind threatened by the steam shovel, the road builder, or the woodsman.

IF you do you should know your wild flowers. You will find this knowledge in text and in many pictures in

PIONEERING WITH WILD FLOWERS

an attractively written, fully-illustrated book based on a lifetime of study and experience raising wild flowers.

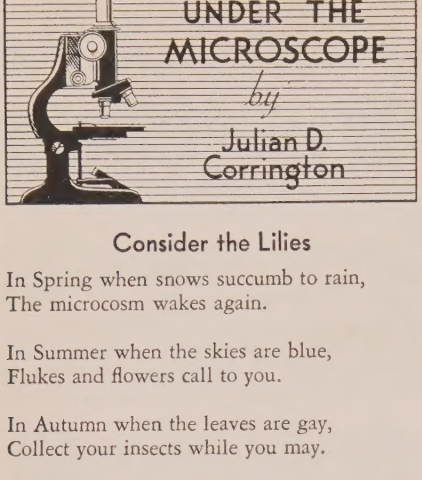
Send Two Dollars to
BOOK DEPARTMENT
AMERICAN NATURE ASSOCIATION
1214 16th St., N.W., Washington, D. C.

POCKET NATURE LIBRARY

Guides on Trees Birds, Flowers Butterflies
Set $5.98

The full set of four volumes contains 1,000 pages illustrated by 700 color plates and many black and white illustrations. Bound in flexible fabrikoid. Each $1.50.

NATURE BOOK DISTRIBUTORS
1212 16 St., N.W., Washington, D.C.



Consider the Lilies

In Spring when snows succumb to rain,
The microcosm wakes again.

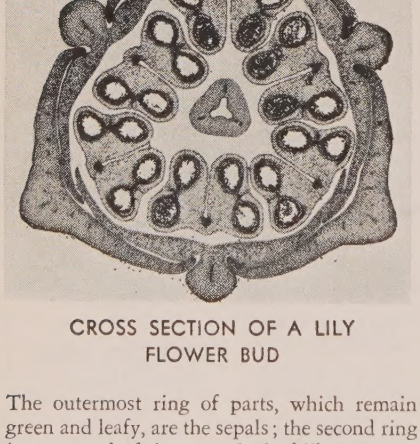
In Summer when the skies are blue,
Flukes and flowers call to you.

In Autumn when the leaves are gay,
Collect your insects while you may.

In Winter when the storm king rides,
Mount all your loot on micro slides.

It's the season, mates, that gets your scribe that-a-way. A little po'try now and then is relished by all kinds of men, even those supposed prosaic individuals who twirl gadgets on microscopes, and a brief calendar of events will call attention to seasonal activities with the eye of ten thousand wonders. As we write these lines a late April snowstorm has encased daffodil and magnolia blossom in a sheath of ice, and our sympathies go out to our inarticulate brethren of petal and stamen. So we are moved to tell you something about their construction, and how it may be studied via the microscope.

When one begins an elementary survey of botany in the higher plants he learns that the basic structural parts are root, stem and leaf, and that the flower is composed of modified leaves. This last fact is most easily seen by preparing a cross section of such a flower bud as that of the lily, as in one of our illustrations.



CROSS SECTION OF A LILY FLOWER BUD

The outermost ring of parts, which remain green and leafy, are the sepals; the second ring is composed of three petals, leaf-like in structure, although not green in color. Then come six stamens, representing the male sex, and finally the female portion in the center, a single pistil of three divisions. Hence the lily is representative of the monocotyledons, one of the two main divisions of flowering plants in which, among other differences, the floral parts are in threes or multiples of three. Grasses, sedges, palms, lilies and orchids are the chief representatives. The dicotyledons, including most of the familiar higher plants, have the floral parts mostly in sets of fours and fives.

This lily cross section shows what is termed the floral diagram, being as plain and simple in construction as those geometric diagrams that the botanist constructs to explain relations of parts in more complex flowers. Let us examine it a bit more in detail. The sepals and petals have a midrib, containing the main fibro-vascular bundle, which is continuous from the stem and runs up through the petiole or leaf-stalk to supply the leaf with water, minerals and stored food from the roots, corresponding in general function to the blood vessels of an animal. This bundle gives off branches repeatedly, forming the veins of the leaf, and these are cut across in making the section, showing a row on each side of the midrib. An upper and a lower epidermis may be seen as pavement-like cells lining both surfaces of either sepal or petal.

A complete stamen, as seen in side view in our portrait of a wheat flower, consists of a

SIDE VIEW OF WHEAT FLOWER

stalk, the filament, and an expanded sac-like part, the anther, in which the pollen grains are borne. In the lily section, the upper terminus of the filament is noted as a rounded black area, from which depend the two halves of the anther, each with two pollen sacs or locules. Later in development, the two chambers in each half-anther become confluent, making one large cavity, and the contained pollen grains are shed to the exterior by a split, the beginning of which is already indicated in the section, between the two locules of a side.

A complete pistil has a terminal portion, the stigma, to receive pollen grains; then a more or less elongate shaft, the style; lastly, a basal swollen portion, the ovary, in which seeds are formed. A feathery type of stigma is seen in the wheat picture. In the lily section, the cut is at the level of the ovary, which is here compound because made of the fusion of three component parts, the carpels. In the buttercup there are a number of separate carpels, each of which makes up a separate and complete pistil.

While the sepals and petals are obviously modified leaves, the stamens and carpels do not appear to be such, as they are highly altered. However, the clue to their true nature may be seen in certain plants; for instance, in the white water lily, if one examines the petals, and passes from the outside toward the center of an opened blossom, there may be noted a complete series showing a perfect transition from petal to stamen. Buttercup carpels are green and represent small leaves that roll up into sacs to enclose a future seed.

The immense amount of modification and variation from the simpler plants constitutes an exciting study with flowers, correlated with their habits, especially in relation to pollination. Stamens and pistils may occur on separate (unisexual) flowers; the accessory parts —sepals and petals—may be fused, present or absent; the usual radial symmetry may become bilateral; anthers may be united into a ring. Endless differences exist, many of them used in classification.

All of these points may be examined either by dissection or by the making of slides. To dissect a flower, the various members are removed, one ring at a time, beginning with the outermost, and a dissecting microscope, or the lowest possible power of the compound instrument, is essential. Slides may be whole mounts, as in our illustration of the wheat flower, or sections, as in the lily bud. Lacking woody tissues, flower buds section readily by the usual paraffin method. Fix in FAA and stain with hematoxylin and eosin.

The minute flowers of the grasses, as wheat, make most attractive whole mounts since they require magnification and are unknown to the average person. Fix in any standard reagent, as FAA, and stain with borax carmine or light green. Mount with thin cover glass props. The formula for FAA (formalin acetic alcohol fixer) appeared in our March, 1939, issue.

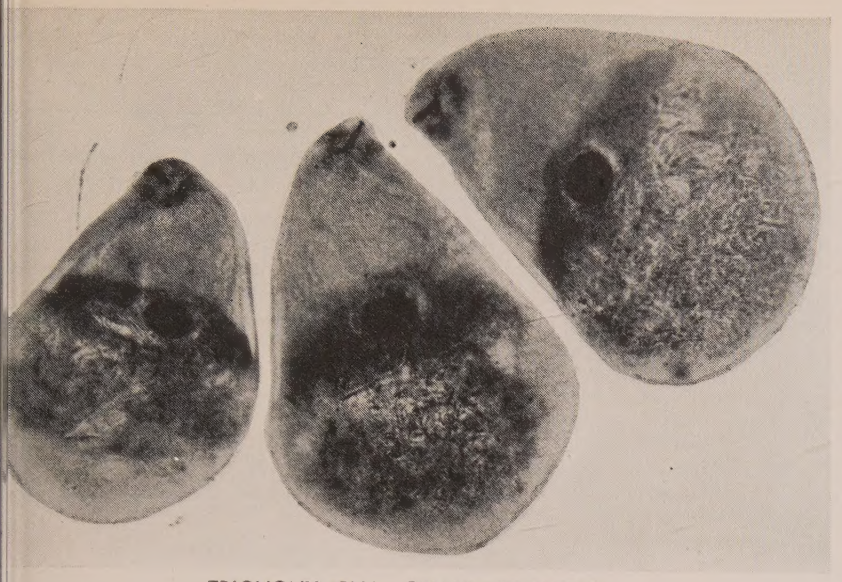
The Cellulose Eaters

In the February issue of this year we described the insect order of termites and promised a further story on the protozoans to be found in the intestine of these tiny creatures. Termites are infamous as destroyers of wooden articles, from timbers of buildings to fine pieces of furniture, and have an additional interest for the biologist, because they harbor a protozoan fauna that makes possible that rarest of accomplishments, the digestion of cellulose.

This material is utterly indigestible to man and most other higher animals. It is perhaps the most characteristic of plant tissues, making up cell walls and occurring in concentrated form in wood; it is responsible for the rayon and other synthetic fiber industries of recent discovery. The few animals that can tackle woody substances and convert them into food, such as termites, the wood roach, stag beetles, cattle and other ruminants, cannot of themselves perform this digestion at all, but do so because of the protozoa that are found teeming within their alimentary canals. Of these the best known types occur in the gut of termites, and we shall concentrate attention on the most widely-studied genus, *Trichonympha.*

As background, one needs to know something of the relationships of animals one to another, to appreciate the significance of the condition we wish to describe. There are probably no animals that live completely unto themselves; all species have reference to others in one way or another. Animals cannot be isolationists but must adapt themselves to get along with their neighbors as best they may, according to the particular environment to which they are adjusted.

Most conspicuous is the relationship of predator and prey, as with the lion and ante-



TRICHONYMPHA—CELLULOSE EATERS

; the one seeking to ambush, outwit or peed the other, who tries concealment, de- ive weapons or escape. To eat but not to aten is one of the first principles of ex- ace. Such animals naturally do not live ther, but merely occupy the same general ronment, and are said to be independent. Much more intimate is the condition known ommensalism, in which two species asso- , one deriving all of the benefit, but not e expense of the other, as with certain ll beetles dwelling in ant nests, or the in which a spider crab catches a ride by ing to a jellyfish. When two species live ther, one deriving all the benefit and at expense of the other, the union is para- m, as with the liver fluke and its host, the p, described last month.

here remains that state of affairs termed iosis (life together) or mutualism, in h two species live together and both de- a benefit. Stock examples are the ant and a, or man and his cattle, but there are a many others, among which our present is a celebrated one in biological circles. *honympha* is a flagellate protozoan—that member of the Class Mastigophora, in h the means of locomotion is by the lash- of one or more long whip-lash structures, lagella (little whip). Of the two sub- es, the Phytomastigina are mostly plant- in their method of nutrition, having rophyll, while the Zoomastigina lack this stance and must feed on organic materials, ith typical animals. Our example belongs his second group. *Trichonympha* is in- led in the last of the four orders, the ermastigina, all members of which are abitants of the gut of termites or other cts, as commensals, parasites or symbionts. Our illustration shows three specimens of *honympha* photographed from a perma- t slide made by the method here recom- mended. At the more pointed anterior end is a darkly-staining axial core, while near the center of the cell is the single nucleus. The large number of long flagella are difficult to photograph and do not show.

This protozoan elaborates certain enzymes or digestive ferments that attack cellulose and render it soluble. So many individuals are present within a single host insect that a large amount of excess food material is available for the termite. Here we have then a fine example of symbiosis: the termite chews and swallows small bits of wood and thus furnishes a never-failing supply to the flagellates without effort on their part, and provides them also with an environment of suitable temperature, moisture and protection. In return the protozoans convert an otherwise indigestible substance into products that the termite can use as food and be relieved of any prolonged search as well as competition with other species for the more usual food supplies.

Termites occur in Nature as inhabitants of dry wood, moist wood, or subterranean galleries, one or the other of these three types being found in nearly all parts of the United States. Search for them under logs and stones and in stumps or fallen timbers by cutting into these or tearing them apart. Magnification is necessary in order to dissect a termite and remove the intestine to a slide; a binocular or dissecting microscope is best, but a compound instrument may be used by unscrewing and removing the front combination of the low power objective. With miniature microscopes, use the lowest power obtainable, preferably with the special low power eyepiece obtainable with some makes.

Tease the alimentary canal apart with needles while it is lying in a drop or two of normal saline, add a cover glass, then place the slide for observation with high power, since the parasites are minute. By cutting

SCHAUDINN'S FLUID

Corrosive sublimate (bichloride of mercury), saturated aqueous solution ..... 2 parts
Alcohol, 95% ..... 1 part

When ready to use, add to the above mixture from 1 to 5 parts glacial acetic acid and warm the whole to about 70° C. Widely used as a fixer for protozoa

The addition of two extra objective lenses to the Bausch & Lomb New Gem Microscope raises its power to 420 diameters. Regular New Gem, 72 to 150 power, complete with instruction book, $14.50. Additional objectives, with "Microscope Experiments" Book II, $2.50 each.

FREE BOOKLET 24-page booklet tells of the fascination of microscopy as a hobby, describes Bausch & Lomb microscope equipment for the amateur.

BAUSCH & LOMB, 378 Bausch St., Rochester, N. Y.

BAUSCH & LOMB

MIRAKEL OPT. CO. DAYLUX BINOCULAR

POCKET PRISM NATURE GLASSES

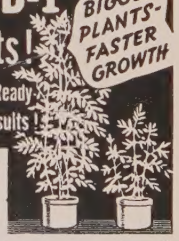
New and Used Field-glasses, Telescopes, Microscopes; all Makes, types and sizes, to fit all pocketbooks. Glasses exchanged: repair work guaranteed. Catalogue free.

J. Alden Loring Box K-2 **Owego, N.Y.**

NEW VITAMIN B-1 Transforms Plants!

BIGGER PLANTS-FASTER GROWTH

Now Pure Crystalline Powder In Ready-To-Use Tablets For Amazing Results!



... You know how essential Vitamin B1 is to human life. Now out of Southern California comes the amazing discovery that Vitamin B1 works miracles with plants, flowers, trees, etc.!

... Scientific tests show vitamin-treated snapdragons 6 feet tall, daffodils 42 inches with tremendous flowers, 5-inch rose buds. Other startling results show faster growing, healthier plants with giant blooms; seedlings matured in one-half usual time with sturdier plants; rejuvenation of sick and straggly plants; roses transplanted while flowering; root rot stopped in valuable trees, etc.

... Now one of America's largest and oldest manufacturers of vitamin products has specially compounded pure crystalline powder Vitamin B1 into convenient, ready-to-use Tablets for garden use. No bothersome mixing. Simply drop one tablet into any container of water and this precious miracle-working liquid is ready for instant use.

... *Money Back Guarantee* — Send only $1 (postpaid) for large bottle of 150 WRIGHT B1 TABLETS (enough for an average garden for season) with directions for its many garden uses included. If not more than delighted with results — if you do not see amazing improvement in plants and flowers — your money refunded.

Distributors and Dealers — write for special introductory offer.

THE WRIGHT CO., DEPT. B 1122 NO. LA BREA, LOS ANGELES

ALNICO MAGNET BARS

IT FLOATS

Strong enough to balance in mid-air. Can be used for hundreds of experiments.

Horseshoe magnets from ½ oz. to 2½ lbs., bar magnets 3/16—¼—⅜—½ inch diameters. Iron-clad magnet, 7½ oz., supports 30 lbs. Freak magnets having 2 North Poles and South in center. Prices from 20c to $9.50.

$1.10 PR

BLAN 64-W Dey St., N. Y. C. Established 1923

down the light one may see the action of the flagella. Permanent slides are made from such a preparation by flooding under the cover glass a few drops of warm Schaudinn's fluid as the fixer for 15 minutes; alternative fixers include Bouin's, Worcester's, Gilson's and others.

After fixation, draw off the fluid with a scrap of filter paper at one edge of the cover while a wash of water is being applied at an opposite edge, then handle the staining in the same manner, followed by dehydration, clearing and mounting. As each new reagent is added by pipette at one side of the cover, the old is drawn off at the opposite side, an operation which must be slowly and carefully done. The material must not be allowed to become dry at any stage. Any of several stains may be used, as eosin or light green, but iron hematoxylin (October, 1939, issue) gives by far the best results.

This replacement method of handling the objects is tedious and the writer prefers to coat a slide with a thin film of Mayer's albumen fixative (March, 1939, issue). When suitable material is found it is transferred by pipette to this slide and allowed to become almost but not quite dry. By the time this slide is still moist, without standing water on the surface, it may be placed in containers of the various reagents and otherwise handled as an affixed section, a much easier and more certain procedure, and necessary if the iron hematoxylin technique is to be followed.

News and Notes

From the Bangor, Pennsylvania, High School, Sidney Monas, student and ASAM member, writes interestingly of what the school Microscope Club has accomplished. Students elsewhere, as well as teachers, may find in his letter some points applicable to their own situations.

"As a High School organization we have the privilege of using and meeting in the school laboratory. Mr. S. C. Schmoyer, our adviser, is instructor of biology.

"At first we had to cope with the problem of graduating seniors, but have decided that seniors must relinquish their memberships upon graduation. New members are chosen yearly and regulated by the number of seniors graduating the year before. But for this the club would soon become too large, and furthermore there is no way of notifying graduates as to meetings.

"We are in our second year as an official high school organization. The idea for the club was hatched in the respective crania of Mr. Schmoyer and myself. We started with nine members, each intensely interested in the study of the microscope. Before the middle of the year it was suggested that we popularize microscopic science, as well as the club, throughout Bangor High. The next month we gave a program in which we featured the lives of great microscopists, and it was the only successful one given by any extra-curricular organization in the school. At the beginning of this year twenty-four students came out for membership and of these, fifteen were accepted. On January 12 we presented a successful radio sketch in Assembly, using the broader theme, 'Science in America.'

"Today everyone in Bangor High School is interested in its Microscope Club, and many of these are interested in the microscope itself. For the sake of convenience as well as for that of keeping a high standard, membership has been limited. The Club charges no dues. All expenses are met by bake sales and the like. Each member is required to complete at least one project dealing with the microscope during the school year. Members interested in particular branches of this science are permitted to do research work and lecture to the Club on them. I really believe that we have done much to popularize the greatest of all sciences—microscopy—and I hope that by joining the ASAM we shall be able to enjoy it even more than before."

Trade Notes

For those who wish a comprehensive background in order really to understand and interpret their microscopic studies in histology and related fields we recommend the new (sixth) edition of Williams' *A Textbook of Anatomy and Physiology*. Professor Williams has produced an integrated volume covering the whole field of human anatomy, physiology, histology and embryology. For example, in the case of bone, one learns how bone is formed in the embryo, structure of the bone cell and how numbers of these combine into bony tissue, union of this tissue with others to produce a complete bone, kinds of bones, how they are coordinated to make up the skeleton, and how bones operate in conjunction with tendons, ligaments, muscles and other structures to make an articulated and mechanized framework for the body. Considerable stress is laid throughout on the cells as units of body building and operation, tying up closely with microscopic work. Each chapter concludes with practical suggestions and summaries and a section on "how to study this chapter." There is a fine and complete glossary. Pp. 607, figs. 367, 29 in color. W. B. Saunders Co., West Washington Square, Philadelphia. $2.75.

The *Adams Scopelite* is a recently developed illuminant for the microscope. Small, light and compact, it has a moulded bakelite body, chromium-plated concave reflector, 10 watt, 110 volt bulb, louvers for air circulation to prevent overheating, and 6-foot cord and plug. It may be stood in front of the microscope or, with the microscope mirror removed, laid beneath as a substage lamp. Complete, with frosted daylight filter, $2.50; with Corning Daylite filter, $3.25. Clay-Adams Co., Inc., 44 East 23rd St., New York City.

Our offering this month is right down the alley of all those interested in photomicrography, and should be obtained also by those others who think they may wish to take up this most fascinating of indoor hobbies in the future. It is a large-sized, 5-page reprint, with cover, of Dr. Max Poser's article, *Essentials of Photomicrography,* from the February, 1940, issue of *Photo Technique,* and sent us through the courtesy of the Bausch & Lomb Optical Company. A full discussion of the all important subject of illumination is followed by work with both low and high powers and determination of magnification, and there are nine fine illustrations. Send a 3c stamp to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C., to secure your copy.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N.W., Washington, D.

American Society of Amateur Microscopists

President, Simon Henry Gage, Ithaca, N. Y.

Permanent Secretary, Julian D. Corrington, Chestertown, Md.

Official organ, *Nature Magazine*, Washington, D. C.

Address all communications concerning the Society to Dr. Corrington at Chestertown, Md. Application for Membership form sent on request. Dues, one year, fifty cents; two years, one dollar.

A.S.A.M. News

Bulletin #3 is about ready to go to "press" with a number of highly interesting articles on all phases of microscopy, from elementary to advanced. Its appearance will be preceded, however, by our first special or Service Publication, which is designed as a complete instruction manual for the guidance of ASAM chapters. We have been working on this booklet for a long time and you will find, we believe, that it fully covers the subjects of how to get started in organizing a chapter as a local microscope club; what to do and when to do it; how to run the chapter after it is organized with details about programs and activities and a model constitution and by-laws. It concluded is a lengthy list of sources for all sorts of supplies used in microscopy, and a bibliography of the more important periodicals and books which every chapter should secure.

Service Publication #1, Organization and Maintenance of ASAM Chapters, will be sent without charge to any member requesting it direct from Julian D. Corrington, 118 Water St., Chestertown, Md., and has already been mailed to all existing chapters. Teachers, factory supervisors and others who are not members, but are interested in the idea of starting a microscope club in their school, factory, or community; Boy and Girl Scout executives, Y. M. and Y. W. directors, and those in similar positions, should first take out a membership by dropping a postal card to Dr. Corrington and requesting a membership card. When this has been filled out and returned, ask for a chapter petition form and this Service Publication.

In this connection we may remark that a number of requests have come in from non-members for copies of Bulletin #2, and these cases are being handled in the same manner, the writer being asked to join the ASAM first, since the Bulletin is sent only to members. As several have remarked, any of these publications is worth the low cost of a single year's dues—fifty cents.

Since our last issue a chapter has been formed at Seattle, Washington, through the efforts of member Richard Peterson, 39 Meridian Ave., to whom inquiries from the district should be addressed, and aided by member J. C. Ross who also participates actively in organizing this rapidly growing group. Members center mainly around advanced students at the University of Washington, many of whom are doing excellent pieces of research along microscopical lines. As a title they chose the name Seattle Chapt